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PAPER TRADE JOURNAL

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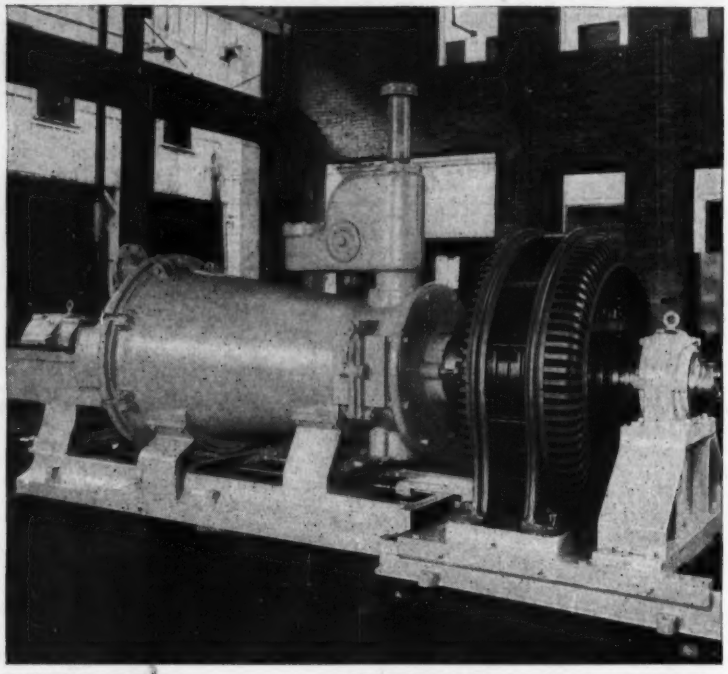

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PAPER TRADE JOURNAL

ESTABLISHED 1872

SIXTY-THIRD YEAR

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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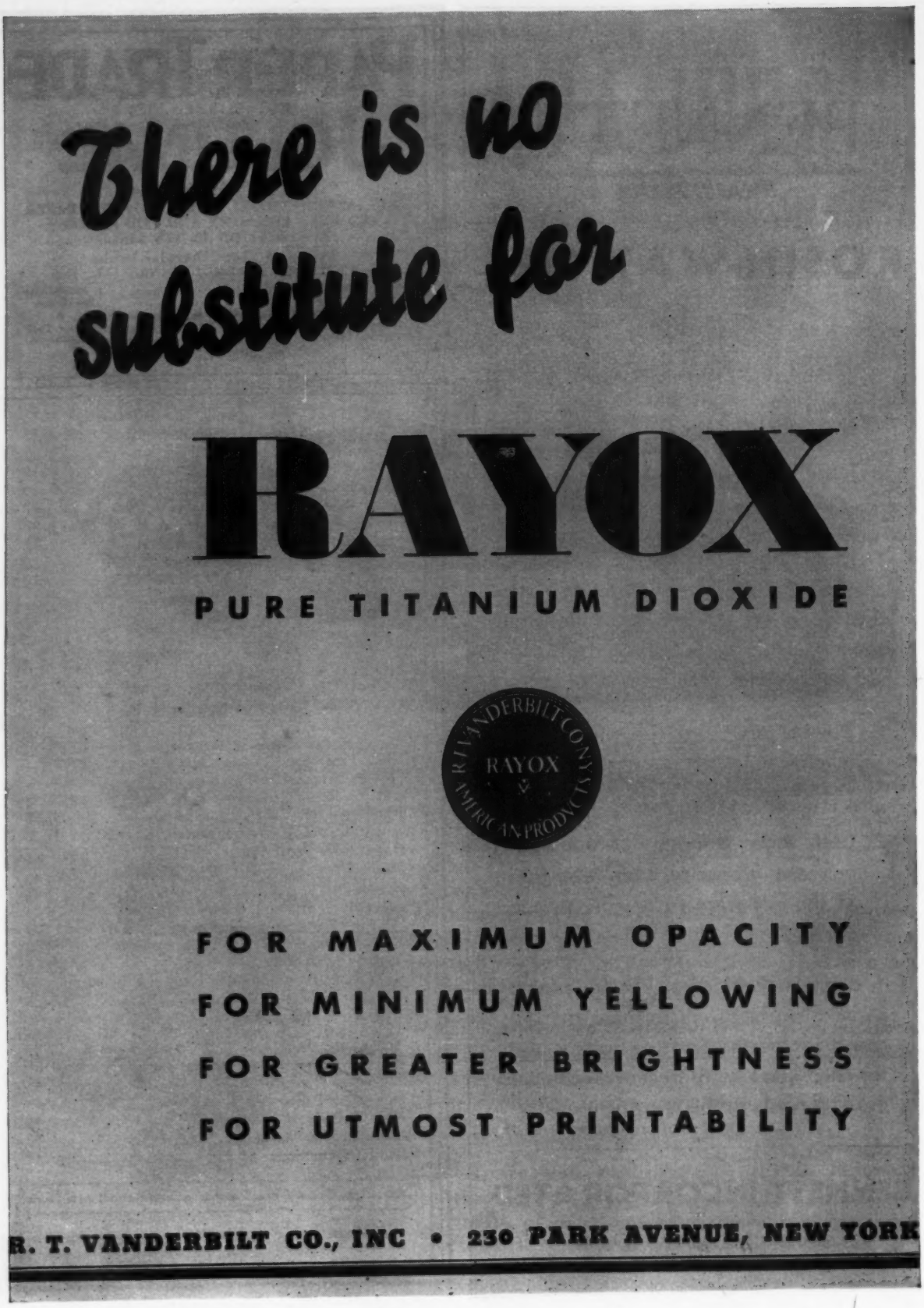
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L. J. Belnap Reviews Newsprint Paper Situation

President of Consolidated Paper Company Criticizes Leaders In Industry Who Made Fetish of Volume In Attempt to Make Profits As Individual Units—Sees Little Prospect of Increased Prices This Year and Is Only Hopeful for 1936—Board of Directors Re-Elected At Annual Meeting Held Last Week in Montreal

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., July 1, 1935—The remarks of L. J. Belnap, president of the Consolidated Paper Corporation, at the annual general meeting of that company here a day or two ago, were to the effect that no increase in the price of newsprint was in sight for this year, and that he was "only hopeful" for 1936. At the same time he made it clear that the only hope of the industry pulling itself out of the hole it was in was an increase in price.

Referring to the rising trend of consumption, he said that while the production of newsprint by Canadian mills last year was approximately 98 per cent of 1929, the peak year, the excess capacity at the present time was estimated at 25 per cent.

Mr. Belnap was severely critical of those leaders in the industry who made a fetish of volume, in an attempt to make profits as individual units at the expense of the industry as a whole. This he termed highly illusionary, stressing that only by co-operation among the producers could a sound situation be developed for the industry. Discounts, rebates and other price concessions to secure tonnage were evils which attended the undisciplined scramble for volume.

In commenting on the results attained by the corporation in the first quarter of 1935, the chairman stated that the rate of production showed an increase of 5 per cent over the corresponding quarter of last year, while shipments recorded an increase of 9 per cent. He pointed to steadily rising costs, pointing out among other things that in 1934 taxes paid by the company, at approximately a million dollars, was equal to 28 per cent of the amount paid in wages by the company.

Gross of the company in the last fiscal year amounted to $12,000,000, yet not one cent was available as wages for the capital, which has played such an important part in the creation of the company, the president stressed. It was incidentally pointed out that during the past year the company's average cost per ton at newsprint was $2.50 below that of the preceding year.

Apart from the president's remarks, the meeting was largely a routine affair and resulted in the re-election of the board of directors.

Consumption Still Going Up

Returns just made public by the Dominion Bureau of Statistics show that the export of newsprint paper in May totalled 4,797,619 cwt. valued at $8,224,031 compared with 4,141,416 cwt. at $7,618,467 a year ago. Leading purchasers of newsprint paper were, the United States with 3,978,821 cwt., Australia 233,339 cwt., Japan 146,348, China 127,306, and the United Kingdom with 85,909 cwt.

A substantial increase was shown in export of wood pulp and screenings during May which totalled 1,227,000 cwt., valued at $2,619,614 against 1,034,698 cwt., at $2,163,636 in the same month last year.

Pulpwood exported totalled 44,223 cords valued at $315,618, all of which went to the United States. A year ago the amount was 30,946 cords at $215,612.

National Cellulose Co. To Open New Plant

SYRACUSE, N. Y., July 2, 1935—The National Cellulose Company, now operating its Baldwinsville plant at full capacity, plans to open a new plant in Syracuse in about a month and a half, with 150 new workers added to its personnel. It will be a converting plant, according to company executives, and in it facial tissues and other paper toilet accessories will be manufactured.

The manufacture of paper will be continued at the plant, where John J. Sullivan is manager. The paper will be trucked into Syracuse, where it will be converted and glazed for commercial use. The offices also will be moved from Baldwinsville to Syracuse.

The company officials said they were unable at this time to state definitely where the plant would be located, as they have not yet finally completed negotiations for the lease of the building which they expect to use.

The coming of the National Cellulose Company into Syracuse has been under discussion for a year and a half and Frederick E. Norton, secretary, and other officials of the chamber of Commerce, have worked hard during that time to bring it about.

Chemical Paper Co. To Build

HOLYOKE, Mass., July 2, 1935—The Chemical Paper Manufacturing Company has been granted a permit for a two-story reinforced concrete building as an addition to its hydraulic plant. The estimated cost is $25,000. The contract has been let to Daniel O'Connell's Sons.

Large Swedish Pulp Shipments for Marathon

Two Cargoes Arrive for Ashland Mill, With Third Cargo En Route—Rafting of Pulpwood Under Way for Consolidated Water Power & Paper Co.—Articles of Lawrence Institute of Paper Chemistry Amended—New Staff Members Appointed

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 1, 1935—Port facilities of Ashland, Wis., are busy these days taking care of summer imports of raw material. Two cargoes of Swedish pulp have arrived thus far for the Ashland mill of the Marathon Paper Mills Company. They total 13,500 bales, and a third shipment is *en route.*

The first shipment of sulphite wood pulp was brought from Robertsfors, Sweden, by the Swedish steamship *Kristianafjord,* and was transferred at Sorel, near Montreal, to the Canadian steamer *Newbrundoc.* The second shipment was brought from Montreal on the Canadian steamer *Novodoc.* A crew of 165 men was put at work reloading the bales from boat to freight cars, to be moved to the Marathon yards, and piled for later use.

Rafting of pulpwood to Ashland for the Consolidated Water Power and Paper Company of Wisconsin Rapids, Wis., is also under way. The company's tug *Butterfield,* of the Newaygo Tug Lines, Inc., subsidiary, left with a crew of twenty-three men last week for Jean Pierre Bay, northeast of Port Arthur, Canada, and will return with the first raft July 7 or 8. Five rafts will be towed across this season. The pulp wood hoist at the Ashland docks, wrecked by windstorms last year, has been repaired, and will be ready to operate when the logs arrive. They are reloaded on cars for distribution to company mills.

Institute of Paper Chemistry

An amendment to the articles of incorporation of the Lawrence Institute of Paper Chemistry, Appleton, Wis., has been approved by the board of trustees, and filed with the secretary of state. The amendment is signed by Ernst Mahler, vice president of the Kimberly-Clark Corporation, who is president of the board, and Dr. Henry Merritt Wriston, secretary. It provides:

"That the original incorporators shall have the right to solicit and accept contributions for the support and maintenance of said proposed institution of research and learning, and that said original incorporators shall have the right to issue, give and grant membership in this corporation to any or all of those from whom they accept contributions, or to the nominees of said contributors; and the board of trustees shall have the right to issue, give and grant membership in this corporation to any or all of those from whom they accept contributions and to continue or discontinue the future membership in this corporation on such terms and conditions as they, from time to time, specify."

This change will permit the Institute to expand its membership, and make the organization of greater service to a larger part of the industry. Its scope has become nationwide, after its original start as a Wisconsin institution.

Appointment of two new staff members has been announced. Dr. Paul K. Winter, for the last three years head assistant in the division of analytical chemistry at Ohio State University, has been named research assistant. Dr. Winter obtained his Ph.D. degree at Ohio State in 1934. The other appointee is Dr. Romund Moltzau, an expert in X-ray analysis of crystals. He obtained his Ph.D. degree at the University of Minnesota this year, and also has been made a research assistant.

Dr. Otto Kress, technical director of the Institute, is spending the summer in Europe, where he will devote his time to a study of processes in use in paper manufacturing sections abroad. He will return in September to resume his work.

Reforestation Program

An allotment of $400,487 of work relief funds has been made to the state of Wisconsin by the United States forestry department. It will be used for reforestation, fire protection and other improvement in federal forest areas. Expansion of the Civilian Conservation Corps activities will take effect about August 1, and some of the funds will be used for this purpose. In preparation for this larger program, twenty-four technical foresters met last week at Virgin Lake, near Rhinelander, Wis., for a training course of one month under the direction of Louis Pomrening, acting director of the Huron National Forest in Michigan. A total of 115 camps will be added in the north central region embracing Wisconsin, Michigan, Minnesota, Missouri and Illinois. Foresters at the school will supervise the work in these and other federal forest unit camps. The forestry staff of the Milwaukee, Wis., office, in charge of E. W. Tinker, federal forester for the Lake States, are assisting in the instruction.

News of the Industry

Manufacture of paper will be demonstrated at a Milwaukee and Wisconsin Exposition, to be held at the municipal auditorium at Milwaukee, Wis., Nov. 16 to 24. Exhibits of the products of various Wisconsin mills are also to be arranged. The exposition has as its president John L. Barchard, president of Hummel and Downing Company, paper manufacturers of Milwaukee. Every exhibit will be a live "activated" one, according to the plans.

Improvements are being made at the plant of the J. W. Hewitt Machine Company at Neenah, Wis., makers of paper mill equipment. A new front is to be erected on the building, erected 65 years ago. A new 50-foot chimney was recently completed. The company also plans to build a two-story addition at the rear.

A dispute between the Thilmany Pulp and Paper Company and the city of Kaukauna, Wis., over the assessment of taxes has been settled in favor of the company. The city council accepted the company's proposal after court action had been started to bring about a more equitable assessment.

The company was assessed for $2,210,000, and when a protest was filed, the municipal board of review refused to hear witnesses. A writ of certiorari was filed in the circuit court of Outagamie, and after studying the case Judge E. V. Werner announced that his decision would be favorable to the company. The city council, to avoid litigation, agreed to accept an assessment of $2,000,000. The taxes therefore are reduced from the original levy of $44,200 to $40,000.

A. G. Stone, of Camden, Ark., who was superintendent of the Marinette and Menominee Paper Company's mill at Menominee, Mich., in 1919, has recently been appointed manager of manufacturing of all northern mills of the Continental Paper and Bag Corporation, which include divisions at Marinette and Oconto Falls, Wis., and Menominee, Mich. He will have his offices at York Haven, Pa. Mr. Stone visited his former home at Marinette before going east.

Everett Meyer, who has been employed in the offices of the Badger Paper Mills, Inc., Peshtigo, Wis., has accepted the position of office manager for the Flambeau Paper Company, Park Falls, Wis. He has already taken over his new duties.

Employees of the Marathon Paper Mills Company mill at Ashland, Wis., enjoyed their annual picnic at Prentice park last week. The day was devoted to amusements and contests, and concluded wieh a dance in the evening.

Operations at the Rhinelander Paper Company, Rhinelander, Wis., almost experienced an upset last week when a frightened deer, chased from the nearby woods by dogs, leaped the yard fence, ran through the paper mill, boiler house and engine room, and ended up in the turbine room basement. The deer knocked off steam pipe insulation and switch covers, but was uninjured. It was captured by conservation wardens and liberated again in the woods.

George W. Mead, president of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., has been elected vice president of the board of regents of the University of Wisconsin. He has been a member of the board for some time.

Donald A. Snyder, of the sales department of the Marathon Paper Mills Company, Menasha, Wis., division, and Miss Lois Flood, of Chicago, were married June 22 at Chicago. They will reside at Neenah, Wis.

Ira H. Clough, of the Marathon offices at Menasha, Wis., and Miss Virginia Rasmussen, also of Menasha, were married last week at the First Presbyterian church at Neenah, Wis. They are on a honeymoon trip in the south, after which they will reside at Menasha.

Paper Raw Material Shortage in Germany

An acute shortage exists in Germany for raw materials used in the manufacture of kraft paper, according to Vice Consul J. H. Wright, Cologne, in a report made public by the Commerce Department.

Sulphate pulp, it is pointed out, had formerly been imported in large quantities from Sweden. Extensive contracts of purchase were outstanding but due to governmental foreign exchange restrictions these contracts had to be cancelled. Permits for importation and subsequent payment in foreign exchange now are granted only with great reluctance and the amount of material which can be purchased is by no means sufficient to meet even current needs.

It is reported that one of the largest of the thirteen firms manufacturing kraft paper in Germany recently found it necessary to cease operations for more than one week because its raw material supply was completely exhausted. There is close cooperation between the various concerns manufacturing this product and borrowing of raw material must be resorted to frequently.

In the face of this raw material shortage, demand for kraft paper is steadily increasing, according to Vice Consul Wright. Certain important firms, he states, report that paper is sold before it is made and that they can be assured in advance of the immediate sale of all that they can produce.

Carlisle Paper Mill Is Sold

CARLISLE, Ill., July 2, 1935—Much interest attaches to the announcement that the Alton Box Board and Paper Company, of Alton, Ill., has purchased the Carlisle Branch Plant of the Owens-Illinois Glass Company. The transfer will be made as of June 1, 1935. The change will not have any material effect on the present operating plans of the mill here which was originally established thirty-seven years ago on a very small scale. It is now one of our major industrial establishments, giving employment to a large number of persons and providing a market for thousands of bales of straw from Clinton, Washington, St. Clair, Maison, Monroe, Randolph and other counties in Southern Illinois. The largest portion of this raw material is hauled in by trucks.

Plant Manager William P. Hinkel in commenting on the transfer says: "The expansion of the Owens-Illinois Glass Company has been such that the production of the Carlisle Mill will be inadequate to take care of their needs in the future. It is the intention of the Alton Box Board and Paper Company to erect a machine at Alton in line with the memorandum given here.

"The operation of the Carlisle Plant will continue as before with no changes in personnel. The On Ized Club will also continue.

"The Alton Box Board and Paper Company is one of the most successful and efficiently operated mills in the United States and I know that this change will work for benefit to all our employees."

The Alton Box Board and Paper Company, with headquarters in Alton, Ill., and a branch at LaFayette, Ind., in addition to the one in Carlisle, has been in existence for thirty years. From a small beginning it has expanded until it is among the leading manufacturing institutions of the kind in the United States.

In a company memorandum announcing the purchase of the mill, the officials make the following statement:

"The Alton Box Board and Paper Company propose to erect a new modern straw mill at their plant in Alton. The contemplated machine will be one of the largest and most modern ever constructed.

"It is the plan of the Alton company to continue to operate the Carlisle mill in the future the same as it has been in the past. The new contemplated machine at Alton is to take care of additional tonnage which the Owens company heretofore has been unable to furnish because of the limited capacity of the Carlisle mill.

"The requirements of the Owens company had increased by such proportions in the last several years that the Carlisle mill no longer had the capacity of taking care of anywhere near their requirements, the majority of which has been purchased through various other paper board concerns in the Industry."

The Alton concern has been selected by the Owens company to manufacture their excess tonnage.

Flambeau Paper Co. to Reorganize

APPLETON, Wis., July 1, 1935—Due to the desire to affect a reorganization of the capital structure and to get in all outstanding bonds, the Flambeau Paper Company has applied through the court for reorganization. Judge Patrick T. Stone has scheduled a hearing for July 2 on the question of an order continuing the company in charge of its properties pending reorganization.

It is said that this action does not effect the credit position of the company which is more favorable than it has been for a long time. The company is running with a large backlog of orders.

Chicago Paper Market Conditions Satisfactory

Fine Paper Section Displays Strong Undertone—Sulphite Bond Quotations Holding to Schedule—Coarse Paper Prices Firm, Despite Light Demand—Groundwood Papers Show Improvement—Better Grades of Paper Stock More Active

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., July 1, 1935—Paper and supply manufacturers in Illinois are immensely relieved over the fact that the Illinois Legislature will probably close without the enactment of any legislation covering unemployment insurance and any new laws governing workmen's compensation and occupational diseases. All three had been very threatening throughout the entire session. Along with this relief, the manufacturers and mill representatives are finding the markets retaining their stability as to price despite the constant stream of rumors to the contrary.

The sulphite bond market has shown no hesitance as to price structure although demand has not been quite so heavy during the week. This condition is reported as prevalent in the entire fine paper line where the industry is giving an exceptionally good account of itself despite the absence of code enforcement. Kraft prices were firm during the week although demand was tapering off. Newsprint representatives noted the reported increases in advertising lineage but found no solace in reports that newsprint prices were going to be kept down. Groundwoods, however, continued to show more than ordinary strength with the markets holding up well. Books and covers showed little change except for a slight curtailment of demand. Paperboard was only fair. Waste papers showed slightly more activity, particularly in the better grades.

Association Activities

The city of Chicago was the site of a number of important meetings of the paper industry during the past week. The Mid West division of the Salesmen's Association of the Paper Industry sponsored a large meeting at which many mill representatives outside of the association were invited to attend. This session, held on Monday noon, June 24, featured the speaking appearances of Charles Boyce, executive secretary of the American Paper and Pulp Association and of Colonel Parker, of the Book Paper Association.

Both fully discussed the entire situation in relation to the paper industry as it now stands under the abandonment of NRA code provisions and both seemed to agree that it was possible for the industry to go along, under its associations, exactly as under the code provisions. That the associations ought to function equally well if not better than under the Code was the consensus of opinion, backed up by heartening reports within the industry today.

Optimistic about maintenance, the two speakers urged the mill representatives present to remember that because of their position on the firing line they were in a splendid position to keep the markets stable by refusing to countenance the rumors started by purchasing agents anxious to reap the profits of price cutting.

Friday, July 19, is the date set for the third of the monthly golf tournaments scheduled by the Mid West Division of the Salesmen's Association. The outing, under the direction of Ben Babbitt, will be held at the Bob O'Link Golf Club, Highland Park, Ill.

The Book Paper Manufacturers Association and the Writing Paper Manufacturers Association both held important meetings at the Blackstone Hotel, Chicago, on Tuesday, June 25. The meetings were unusually well attended. The Book Paper group invited the envelope manufacturers to attend various sessions held, while committees of the Writing Paper Association consisting of manufacturing elements, went into conferences with committee groups representing the merchants. Various sub committees also held sessions during the one day meetings.

Illinois Sales Tax Effective

All Illinois organizations operating under the provisions of the recently enacted 3 per cent sales tax will begin today to collect the tax from the consumer public. This includes many firms dealing in paper and paper supplies. Two separate methods of collection will be in effect, the one having to do with sales above 15 cents and the other with sales under that figure and down to five cents. On sales above fifteen cents and including 50 cents, 1 cent will be added; on sales from 51 cents to 83 cents, 2 cents and from 84 cents to $1.16, 3 cents and so on up. Below this figure the Department of Finance has provided 1½ mill aluminum tokens for general use. More than 10,000,000 of these tokens will be in force immediately and an additional similar amount made ready.

News of the Trade

Eric A. Rohrer has been appointed by the Bermingham & Prosser Company to direct the activities of its Stock Division. Mr. Rohrer has long been identified with the merchandising of fine papers. His wide experience and his practical knowledge concerning the requirements of the printing trades, and the utilization of papers for the discriminating needs of the advertiser, are now available to all paper buyers.

The Oxford Paper Company, through Bradner Smith & Co. and Bermingham & Prosser, Chicago distributors, this week issued the first piece in a new series of advertising in which the manufacturers intend "to say very little about paper and a great deal about ways by which advertising and selling ideas and techniques may be improved and intensified." "Printing for Action" is the title of the first of the series and Oxford is defined as a paper filling the requisites of immediate performance, appearance and durability. The broadside is printed on Oxford Mainefold Coated-25 x 38-100 pounds and contains some exceptionally fine color photographs taken from the business advertising world.

Russian Pulp and Paper Industry Expands

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 3, 1935—The pulp and paper industry in the U. S. S. R. is reported to have shown progress over the past four years. A number of new mills have begun operations and the production of paper has increased 18 per cent between the years 1930 and 1934. Newsprint production during this period increased 80 per cent. The manufacture of kraft pulp has been successfully undertaken and kraft paper bags are now replacing jute bags and boxes. The manufacture of the higher grades of sulphate and sulphite papers and of special papers has been introduced.

Bondholders to Consider Offers for Great Lakes

Several Bids Anticipated for Property—Bid Accepted Will Be Submitted to Court for Approval —Reserves Set Up by Receiver G. T. Clarkson More Than Adequate for Their Purpose—Deposit Agreement Extended to July 1, 1936

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., June 31, 1935.—Application was made to the Courts in Toronto this week for authority to receive offers for the property of the Great Lakes Paper Company up to noon September 10, and a meeting of bondholders has been called for September 20, at which any offers made will be considered. It is expected that several bids will be received, at least one of which will be satisfactory to the bondholders' committee, which holds 72 per cent of the $10,000,000 of first mortgage bonds outstanding. All bids received will receive due consideration and the bid accepted will then be submitted to the court for approval.

The bondholders committee has forwarded a letter to bondholders which shows profit for the ten months ended April 30, 1935, at $10,512 before provision for bond interest, depreciation and depletion. This compares with net profit of $121,401 in the twelve months ended June 30, 1934. While no reason is given for this decrease in profit, it is understood that loss of a contract with one publisher in Detroit is responsible for decrease in sales. At the same time exchange on United States funds cost the company $16,298 as compared with profit on exchange of $22,528 in the preceding year. Contingency reserve is higher by $5,000 at $50,000 and fixed charges such as the receiver's fee show no decrease.

At April 30, 1935, the receivership had net current assets of $1,013,046 as compared with $1,076,441 at June 30, 1934. The reduction is due to capital expenditures which are not included in current assets. The receivership has total current assets of $1,605,798 of which $170,739 is in cash and bonds, $701,368 in inventories and $335,743 in advances on current operations. Customers' accounts receivable total $175,168.

The bondholders' committee reports that reserves set up by the receiver are more than adequate for their purpose. It is stated that the committee has been engaged in considering plans for reorganization of the company but that until recently no reorganization could be effected other than by sale for cash. Recent amendment to the Ontario Judicature Act permits sale for a consideration wholly or in part other than cash if sanctioned by bondholders at a meeting to be called and held under direction of the court. This meeting will be held on September 20 and any proposal duly sanctioned and approved at that meeting will thereupon be submitted to the court for acceptance. The committee also gives notice that the deposit agreement dated July 15, 1931, has been extended to July 1, 1936.

Ontario Group for Abitibi

Reorganization of Abitibi Power and Paper Company may be put forward by a syndicate, including a number of prominent Ontario businessmen, if present events develop along anticipated lines. Affairs of the company, as well as those of Price Bros. and Co., Great Lakes Paper Company, and Ontario and Minnesota—all newsprint companies which have gone into bankruptcy—have been studied at one time or another by more than one group. Certain legal obstacles have been in the way of reorganizing the Ontario companies, but with those now out of the way, it is possible to carry out financial changes and thus put them back in a solvent condition. Abitibi went into bankruptcy in September, 1932, when G. T. Clarkson, of Toronto, was put in control. Since then the receiver and manager has made several changes with a view to strengthening the company's position. But the great deal that remains to be done in re-establishing the company can only be accomplished with additional working capital. In order to secure the latter it is necessary to form a syndicate to underwrite whatever new securities it is planned to issue. To this end a number of well-known financiers and businessmen in Ontario have tentatively agreed to co-operate in a scheme to rehabilitate Abitibi. Particulars as to the personnel of the committee are not available, but will probably be made known when plans are further advanced.

Pulpmen's Strike Causing Concern

Official Queen's Park in Toronto this week was reported as concerned over the strike among the pulp cutters north of Port Arthur. Rumor has it that strike conditions are more serious than at first believed and that unless they improve immediately extra provincial police may be despatched to the district as a precautionary measure. Attorney-General Roebuck is said to be waiting Premier Hepburn's decision on the situation before making any definite move. It is understood that the strike, which now involves over 600 men, is confined entirely to those camps engaged in peeling pulp for export under the export policy announced two months ago by the Ontario Government. One of the strikers' claims is that there is, now, too great a spread between what they are paid for their cutting operations and the price received by the exporters. This discontent is said to have been played upon by Red spokesmen, with the result that there has been considerable talk—and rumors have reached Queen's Park—of linking up with the western relief strikers if and when they reach this province. District Inspector Ingram, of Port Arthur, is reporting daily on the situation to headquarters in Toronto.

Fix Papermakers' Wages

Former wage contracts between Canadian and United States mill owners and pulp and paper-workers this week were extended at a meeting in Toronto between company and union representatives. The conference decided on the levelling-up of rates of various types of workmen between certain companies. The basic rate of wages agreed upon was the former contract of 43 cents an hour. Formalities of the agreements have now been completed.

Lubrication Equipment Catalog

Alemite Corporation, Chicago, announces the revised mid-year 1935 Alemite Powergun Equipment Catalog. In 25 pages are presented, in natural colors, all equipment and accessories necessary for every kind of a complete, money-saving lubrication job. Full details and specifications are given, and all prices are quoted.

Demand for Paper Moderately Active In Boston

While the Various Standard Grades of Paper Are In Brisk Request In Exceptional Cases, the Market Generally Rules Quiet to Fair—Orders for Kraft Paper Rather Small, Although Summer Specialties Are Moving In Good Volume

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., July 1, 1935—The Boston paper market was generally quiet to fair during the week under review, although, as in the previous week, in exceptional cases, there was a brisk demand. In several instances, price uncertainties were reported to be holding back business. In some quarters, printing papers moved in good volume. One or two kraft houses were busy handling "a lot of small orders." Kraft papers as a whole were not very lively, although the call for summer specialties helped out considerably. Box board dealers transacted a moderate volume of business, with some interest displayed on the part of shoe box manufacturers, who are optimistic.

The paper stock market was a little less active. Mixed papers and old newspapers remained fairly strong. Bagging as a whole held its own, although there was less demand for foreign manila rope, which declined to 1.80 @ 1.90 from 1.90 @ 2.00. New and old domestic rags continued in about the same position. In foreign rags there was a good demand for dark cottons in France, Germany and England from their places of origin, so that only about 50 tons at a time were offered this country. The price of dark cottons was a flat 1.30, with a tendency to advance.

Paper Manufacturers Exhibit

In the display held in connection with the Regional Convention, District No. 1, of the National Stationers Association at the Parker House, June 25-26, a number of manufacturers had exhibits.

The American Writing Paper Company, among whose products is the "famous Coupon Bond," with a special device, showed in succession thirteen views, recounting briefly the manufacture of fine rag business paper in the mills, from the raw material to the wrapping, labelling and casing. This company distributed attractive packages containing twelve books of matches, bearing the Eagle-A Papers trademark, all wrapped in transparent paper.

Carter's Ink Company, Cambridge, Mass., exhibited a map of the world, indicating the source of raw materials for making products of this concern, including carbon paper, in which Carnauba wax, Montan wax, Ozokerite, bees' wax and carbon black are used.

The Dennison Manufacturing Company, Framingham, Mass., showed lists of price tags.

Eaton, Pittsfield, Mass., displayed various kinds of stationery.

The Southworth Company, West Springfield, Mass., showed Southworth papers, including material for newspaper mats and the mats themselves.

The convention, sponsored by the New England Travelers Club, of which John Brooks, of the Brooks Manufacturing Company, is president, was the biggest stationers' regional meeting ever held. At the business meeting, Walter R. Dolliver, of the Providence Paper Company, Providence, R. I., was elected president. Mr. Brooks was chairman of the hotel committee and a member of the executive and finance, educational, publicity and entertainment committees. Mrs. J. Brooks was a member of the ladies' entertainment committee. R. A. Maish, of the Dennison Manufacturing Company, was scheduled as chairman of the manufacturers meeting.

Luncheon for the ladies at the House of Seven Gables, Salem, Mass., June 26, was by courtesy of a number of concerns, including the Southworth Company and the Dennison Manufacturing Company. Among the donors of souvenirs were the American Writing Paper Company, American Pad and Paper Company and Logan Swift & Brigham Envelope Company. Donors of prizes included Z. & William Crane Company, Southworth Company, F. S. Webster Company, Byron Weston Company, Hampshire Paper Company, White & Wyckoff Company and American Writing Paper Company. Binding of the programs was by courtesy of the Plimpton Manufacturing Company Division of the United States Envelope Company.

News of the Trade

The Arnold-Roberts Company has been appointed sole distributor in New England of the D. C. Colorful Cover and Text Paper, made by the District of Columbia Paper Manufacturing Company, Washington, D. C., and is shortly to issue a sample folder, showing the entire line.

Howard A. Sowerby, associated with Stimpson & Co., Inc., was married June 22, for the second time. The firm and employees presented him with an appropriate present. After a honeymoon Mr. and Mrs. Sowerby will reside at Marlboro, Mass. Mr. Sowerby's first wife died four years ago.

The New England Paper Merchants Association held a meeting June 27, at the Chamber of Commerce with a good attendance. Trade customs were discussed. President William N. Stetson, Jr., presided.

The offices of Storrs & Bement Company are to be closed during August.

George A. Ware, of the American Paper and Pulp Association, was a speaker June 25, during a session of the convention of the National Association of Cost Accountants at the Hotel Statler last week.

Swedish Paper Exports Higher

Exports of paper of all kinds from Sweden during the first quarter was a little over 7 per cent higher than for the first quarter of 1934. Sulphite paper exports, which may be taken as a gauge of production, during the first quarter fell 27,102 metric tons short of exports during the preceding quarter, but exceeded by 2,000 odd tons the corresponding period of 1934. Throughout the quarter negotiations were in progress between makers of wrappings with a view to price fixing. By the middle of February rumors had become so persistent that the combination would soon be effected that a rush of orders resulted, buyers apparently fearing that prices would soon be moved upward. No definite news of the consummation of the cooperating agreement had been gathered by the end of the quarter. A combination of manufacturers of greaseproof papers was also under discussion, along the lines followed in the northern kraft paper industry. Orders on hand at the sulphite mills decreased toward the end of March, as had been anticipated after the undue activity in February.

Philadelphia Paper Market Outlook Promising

Manufacturers Anticipate Broader Buying of Various Standard Grades of Paper—Satisfactory Volume of Inquiries Being Received by Mills and Dealers for Future Requirements—Paper Converters Report Heavy Demand for Specialties

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., July 1, 1935—With the vacation period approaching there is a more hopeful outlook not alone of seasonal requirements but broader buying of paper generally among mills and dealers. There are many inquiries coming into mills for various papers manufactured in the Metropolitan area, indicating that buyers are shopping around before placing orders, and it is through these sources that manufacturers hope to receive results.

Distributors, too, find inquiries for deliveries in the near future developing, and actual orders are being placed by customers who have not been in the market for some time. Stocking among distributors shows slight improvement, although many dealers are fairly well supplied with hold-over goods. Converters report an unprecedented demand for such commodities as bags, cellophane products, boxes and containers, picnic specialties, etc.

Association Activities

At the meeting of the Sub-Committee for the Philadelphia Trading Area, held on Tuesday at 1 o'clock in the headquarters of the Philadelphia Paper Trade Association, Drexel Building, members voted to dissolve the liquidating assets, and a committee, consisting of William S. Wilcox, T. H. B. Smythe and Edward A. Keller, was appointed to proceed with the measures of liquidation so far as the Philadelphia Trading Area is concerned.

Immediately following the Sub-Committee meeting, a special session of the Board of Governors was held at which it was decided to move from the present offices of the Paper Trade Association to Room 355 Drexel Building. Mrs. Doris E. Lewis will continue in the capacity of executive secretary of the association. It was also decided to make the Saturday closing of the association's office a permanent feature all year round.

President Harry S. Platt of the Philadelphia Paper and Cordage Association, Inc., announces that the regular monthly meeting of the association, held on the third Friday at the Adelphia Hotel will be discontinued until September, when they will again be resumed. However, members of the association are invited to a round table conference held on Friday of each week, at noon in Dufors' Restaurant. In connection with these weekly meetings, the following message from Vincent Dirvin, secretary of the association, reads: "During the past months we have all been taxed with the difficulties surrounding Codes, Price Lists, etc. and are now confronted with serious competition. These are days when friendship should be valued very highly, because it behooves each and every one of us to work together to keep our industry on the high plane to which it is entitled. There is no better opportunity of securing the desired friendship than by meeting with your fellow members at our Friday luncheons. Therefore, may we count on your attendance at Dufors' on Fridays at twelve during the summer months, for one and a half hours of relaxation and enjoyment?"

Paper Officials Open Summer Cottages

Morgan H. Thomas, president and treasurer of Garrett-Buchanan Company, Edward A. Keller, vice president and manager and George W. Weaver, vice president and assistant manager, with their families, have opened their cottages at Ocean City, N. J., for the summer season.

James M. Willcox Dead

James M. Willcox, a retired paper manufacturer, died during the week in Media Hospital after short illness. Mr. Willcox, who was 75, lived in Wawa. He formerly owned a mill at Glen Mills. He is survived by his wife, Mrs. Kate Taney Willcox, and his children, James M. Willcox, Jr., Mark Willcox, a vice president of the Pennsylvania Company; J. Taney Willcox, Fielding L. Willcox, Mrs. A. H. Santa Maria and Miss Katharine Willcox. After Requiem Mass at 10 o'clock on Saturday morning in St. Thomas' Church, Chester Heights, interment was made.

Ohio Workman's Compensation Fund

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, July 2, 1935—Ohio workmen's compensation fund is the largest carrier of compensation insurance in the United States, and despite recent increases, the rates compare favorably with any adjoining state, and provide a higher level of benefits, according to an advance report of the Ohio government survey, made public Wednesday.

This fund had an income of $16,000,000 in 1934, from employers having three or more on their payrolls. Disbursements to employees and beneficiaries, totaled more than $13,000,000, of which $9,700,000 was paid directly to injured beneficiaries and $3,300,000 for medical and allied services. During the year there were 150,482 claims filed, and an average disbursement of $93.67 for claims. Many paper mill employees benefited thereby.

Data compiled by the survey shows that since the inception of the fund in 1912 a total of $225,000,000 has been paid in by employers for the protection of their employees, and $185,000,000 has been disbursed for the benefit of disabled employees and their dependents.

Detailed facts pointed out by the survey disclose that 1,500,000 private and public employees are protected, the total payroll covered annually exceeding $1,500,000,000.

Compensation for disability is fixed by law at two-thirds of the weekly wage, or not to exceed $18.75 a week. Insurance paid to widows of employees killed in industry is not more than $6,500, nor less than $2,000.

St. Regis Demolishes Old Mill

[FROM OUR REGULAR CORRESPONDENT]

BLACK RIVER, N. Y., July 2, 1935—A plant here owned by the St. Regis Paper Company is being demolished and considerable valuable timber is being extracted. The mill closed in 1928 throwing half the population out of work although many persons were hired in other branches of the company. It had been rumored for some time that the mill was to reopen under new management. The plant was constructed in 1890 by William Herring and Matthew Mar, of Ohio, was the first superintendent. William Argy also supervised production for a number of years and was followed by Herbert Boyce, who remained in charge until the plant closed in 1928.

Obituary

Joseph Hammond Slater

Joseph Hammond Slater, aged 68, manager of the Escanaba Paper and Pulp Company's plants at Escanaba and Boney Falls, Mich., died June 24, 1935 in the Herkimer Memorial Hospital, Herkimer, N. Y., following four months' illness.

Mr. Slater was born in 1868 at Woolwich, England. He was educated in Canada, where he became interested in the manufacture of paper.

For six years he was superintendent of the Chisholm mill of the International Paper Company and was superintendent at the Glens Falls mill of the company for 3½ years. He was at the Fort Edward mill of the International Paper Company for two years and at the Livermore Falls mill for two years.

For a time he was general superintendent at the Sturgeon Falls Mill of the Spanish River Pulp and Paper Company and later for 5½ years was general superintendent at the Espanola mill of the same company.

For two years he was general manager and secretary of the Chesapeake Corporation at West Point, Va. He was also general superintendent for a time of the Ironsides Board Company, of Norwich, Conn.

Mr. Slater was a member of the Technical Association of the Pulp and Paper Industry; vice president of the Great Lakes Coal Company of Buffalo; vice president of the A. J. Jackson Corporation, Herkimer, and owner of the business block occupied by the latter firm.

While absent from New York, he retained his membership in Herkimer Lodge, F&AM, and ranked as senior past patron of Mystic Chapter 148 OES. He was also affiliated with the Knights Templars, Ziyara Shrine, Rotary Club and the Escanaba Country Club.

The funeral was held Thursday, June 27 at Herkimer, N. Y.

Robert Tuttle Spencer

[FROM OUR REGULAR CORRESPONDENT]

NEW HAVEN, Conn., June 26, 1935—Robert Tuttle Spencer, retired president of the Riegel Paper Corporation of New York City, died today at the New Haven Hospital of a heart attack. He had been ill for several days.

Born in Guilford, Conn., eighty-two years ago, he went to New York City at 19 to enter a cordage firm. Rising to the presidency of the Warren Company, he later became president of the Riegel Corporation which succeeded the Warren Company.

He resided in Orange, N. J., until his retirement from business when he returned to Guilford. His wife, who was Mrs. Abbey Blackman Spencer, died in 1922. He leaves two daughters, Mrs. May B. Demille of Newton Centre, Mass., Mrs. Ethel Kingman of Orange, N. J., and a son, Dr. Harvey Spencer of Wellesley, Mass.

William L. Valiquette

William L. Valiquette, manager of the Seybold Machine Company, Dayton, and for almost forty-nine years identified with the company and the paper cutting industry, quietly passed away May 24, 1935 at the age of sixty-six years.

Mr. Valiquette started at Seybold on January 8, 1897, as pattern maker and draftsman. About 1905 he was promoted to be plant superintendent and in 1915 he became the company's vice president and general manager.

Except for a brief rest period some time after the company's consolidation with the Harris and Potter companies, his entire business career has been inseparable from the company that he loved and whose manager he again became.

Norman L. Daney, treasurer and general manager of Harris Seybold Potter, bears tribute to the outstanding integrity of the man who has been recognized so long throughout the trade as a well known authority.

It was Mr. Valiquette's pride that his organization is trained to a man to carry on in even larger accomplishment and in increasing company success he is honored.

William Kinzeler and William C. Speyer, two of his closest associates tell of the unusual democracy of the man and the respect in which he was held by all who knew him.

Charles Seybold, founder and formerly president of Seybold Machine Company and whose name has been long a household word in cutting machinery, returns for the present to the Seybold division as manager.

Lars Peter Larsen

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 1, 1935—Lars Peter Larsen, 68, assistant stationary engineer of the Appleton Coated Paper Company, Appleton, Wis., died June 22 at Rochester, Minn. He had gone to the Mayo Brothers Clinic after he contracted illness recently. Mr. Larsen had been with the company for the last fifteen years. He was a member of the Associated Stationary and Mechanical Engineers. He was prominent in Moose lodge activities, and was to have gone to Boston July 3 to receive the fellowship degree, the highest conferred. Burial took place at Appleton.

Louis F. Darmstadt

Louis F. Darmstadt, president and treasurer of Darmstadt, Scott & Courtney, Inc., dealers in supplies for paper mills, which was founded by his father, the late Louis Darmstadt, eighty years ago, died June 28 at his residence, 108 East Ninety-first Street, of a pulmonary tumor after a serious illness of six months. He was 72 years old. A widow, Josephine, and a son, Raymond L. Darmstadt, who is associated with his father's business, survive.

Mr. Darmstadt was also president of the A. H. Nelson Paper Company, Inc., and the South and Water Street Corporation, a realty concern.

Walter H. Stearns

[FROM OUR REGULAR CORRESPONDENT]

PROVIDENCE, R. I., June 29, 1935—Walter H. Stearns, 73, retired secretary and treasurer of the Rhode Island Cardboard Company, died today.

He was a director of the Kilby Manufacturing Company of Cleveland, and had been a director of the Riverside Mills at Augusta, Ga., until they were sold five years ago. Among the survivors are his brothers, Charles F. Stearns, former chief justice of the Rhode Island Supreme Court; George R., of Augusta, Ga., and Henry F., of Montreal.

Karl B. Mory

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 1, 1935—Karl B. Mory, who was vice president of the Wisconsin River Paper and Pulp Company, Stevens Point, Wis., met with accidental death at a ranch near Wyola, Mont., June 24. He was a son-in-law of C. A. Babcock, president of the Wisconsin River company. The body was conveyed to Neenah, Wis., his home, for burial.

Middle States Wrapping Paper Men Meet

On motion duly made, seconded and carried, it was unanimously resolved by the members of The Middle States Wrapping Paper Association in regular meeting assembled at French Lick Springs, Ind., on June 25, 1935, as follows:

WHEREAS, there is a tendency at the present time among manufacturers of paper and paper products, particularly in the coarse paper field, to more and more merchandise their products either direct to the retailer or industrial consumer, or through wholesale distributors other than paper merchants, and,

WHEREAS, the paper merchants of The Middle States Wrapping Paper Association are seeking the co-operation of the various manufacturers in their division toward either the elimination of this tendency or toward minimizing it for the future, and,

WHEREAS, a large number of manufacturers have indicated their sympathy with this program and have evidenced their intention of co-operating with the wholesale paper merchant in confining, at least in large part, their sales of paper and paper products to wholesale paper merchants,

THEREFORE, BE IT RESOLVED that the members of The Middle States Wrapping Paper Association hereby urge all members of this organization, as well as paper merchants generally throughout the United States, to confine their purchases to those manufacturers who co-operate with this program of concentrating paper sales in the hands of paper merchants, and further,

BE IT RESOLVED that we urge upon paper merchants throughout the United States the necessity for closer study of the problems of merchandising in paper and paper products, and that not only should loyalty be shown those manufacturers who co-operate with the wholesale paper merchants in their purchases from such manufacturers, but further support should be given the manufacturer in the more efficient merchandising of their products, through education of the paper merchant, stronger effort toward better coverage of the territory on the various products handled by such paper merchants, and a generally more intelligent plan of distribution followed, in order that the manufacturers' products may be given proper distribution, and in order that the paper merchants may become the really efficient unit in the distribution of paper and paper products that they should be.

Various coarse paper manufacturers met with the merchants from a wide area. The resolution adopted at the jobbers' meeting, seemed to meet with the general approval of the manufacturers present.

Merchants in Attendance: C. J. Wittrock, The Paragon Paper Co., Cincinnati, O.; M. V. Wiggins, The Crescent Paper Co., Indianapolis, Ind.; F. Bendel Tracy, Fort Hill Paper Co., Boston, Mass.; L. Schwartz and Martin Schwartz, Schwartz Paper Co., Muncie, Ind.; E. P. Magel, The Crescent Paper Co., Indianapolis, Ind.; R. W. Miller, The Central Ohio Paper Co., Columbus, Ohio; I. F. Kahn and M. Luhrie, Capital Paper Co., Indianapolis, Ind.; Ed Hess, Chatfield Paper Corporation, Cincinnati, Ohio; Fred Korte, Fisher Brothers Paper Co., Fort Wayne, Ind.; Gale Evans, The Cincinnati Cdge. & Paper Co., Cincinnati, Ohio; S. B. Gaines, Capitol City Paper Co., Springfield, Ill.; J. P. Downard, Floyd Smith and Bruce Smith, Louisville Paper Co., Louisville, Ky.; George Tompkins, The Rowland Paper Co., Louisville, Ky.; J. L. Littleton, Springfield Paper and Merchandise Co., Springfield, Ohio; Thomas Willis, Willis & Weber Paper Co., Kansas City, Mo.; Warren Williams, Miller Paper Co., Louisville, Ky.; C. A. Spaulding, Assistant Secretary, The National Paper Trade Association, New York, N. Y.; John L. Richey, Secretary and Counsel, The Middle States Wrapping Paper Association, Cincinnati, Ohio; Charles Orchard, Herman Orchard and Sidney Strauss, Orchard Paper Co., St. Louis, Mo.; J. L. Greenebaum and M. V. Baker, Premier Paper Co. Louisville, Ky.; Phil Howard, Editor, American Paper Merchant, Chicago, Ill.

Manufacturers in Attendance: Neil Nash, Nekoosa-Edwards Paper Co., Port Edwards, Wis.; Roth Herrlinger, Ed Herrlinger and Phil Gates, The Gummed Products Co., Troy, Ohio; "Doc" Edmonds,, Wausau Paper Co., Wausau, Wis.; Ed Jacobs, Triangle Bag Co., Cincinnati, Ohio; Jack Pfifer, Crystal Tissue Co., Middletown, Ohio; R. C. McCaskey, Minerva Wax Products Co., Troy, Ohio; Charles Drewry, Security Bag Co.-Fox Paper Co., Cincinnati, Ohio; Don Fletcher and "Mac" Wellington, Fletcher Paper Co., Cleveland, Ohio; Frank Meiners, Filer Fibre Co., Filer City, Mich.; Henry Vogel, Crystal Tissue Co., Middletown, Ohio; Bob Adair, January & Wood Co., Maysville, Ky.; Sam Meadows, Dennison Manufacturing Co., Chicago, Ill.; Perce Bridge, Brown Bridge Mills, Troy, Ohio; John Schlicht, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.; Fred Mann, Dennison Manufacturing Co., Cleveland, Ohio; John Sparkman, Continental Bag and Paper Co., Chicago, Ill.; Ben Barrows, Brown Paper Goods Co., Chicago, Ill.; H. G. Wintgens, Hoberg Paper and Fibre Co., Green Bay, Wis.; Edgar Hall, Jr., The Central Paper Co., Cincinnati, Ohio; E. E. Brown, Superior Bag Co., Middletown, Ohio; George Sisson and Louis Sisson, Racquette River Paper Co., Cincinnati, Ohio; George Farrow, Hoberg Paper and Fibre Co., Green Bay, Wis.; Larry Doyle, Union Paper and Bag Corporation, New York, N. Y.; Grant Wethers, Union Paper and Bag Co., Chicago, Ill.; Ray Bee and Gunner Olesen, Southern Kraft Corporation-Continental Paper Bag Corporation, Chicago, Ill.

Winner of Golf Events: Bruce Smith, Leather Golf Bag; Gale Evans, Cocktail Set; Charles Orchard, Liquor Set; R. W. Miller, Zipper Bag; S. B. Gaines, Leather Golf Bag; C. J. Wittrock, Zipper Bag; J. P. Downard, Silver Water Pitcher; Louis Sisson, Golf Club; Larry Doyle, Silver Ice Bucket; Fred Mann, Silver Coffee, Cream and Sugar Set; E. P. Nagel, Silver Vegetable Dish; P. H. Bridge, Golf Club; Roth Herrlinger, Golf Club; George Sisson, Cocktail Shaker; Phil Gates, Leather Golf Bag; Floyd Smith, Silver Platter; R. N. Adair, Leather Toilet Set.

Belts to each of the following: George Tompkins, Tom Willis, E. E. Brown, "Ches" Drewry, Ed Hess, Gunner Olesen, Bendel Tracy.

Set of Golf Balls to each of the following: John Sparkman, Ed Hall, "Doc" Edmonds, Jack Pfifer, Phil Howard, Ray Bee.

Prizes Awarded for the Winning Slogan: H. R. Telfer, Electric Wall Clock.

Keith Paper Co. Changes Capitalization

TURNERS FALLS, Mass., July 2, 1935—Stockholders of the Keith company have voted to reduce the authorized capital from $2,000,000, represented by 20,000 $100 par shares, to $1,000,000 by reducing par value of the stock to $50. The surplus account is to be credited the amount of capital represented by the reduction.

Modern Gears In the Paper Industry*

There were gears on the first paper machine I ever saw. That was about fifty years ago. I was a very small boy then and was more interested in catching minnows from the mill stream than in paper machines. But I noticed the gears, because they were noisy. Besides, I was told that little boys must keep their fingers away from the "cog wheels" as gears were called at that time.

I don't suppose that anyone has produced a gearless paper mill from that day to this. Today we use more gears than ever, but they are different gears.

Those of you who have grown up with the paper industry need only look back from ten to fifteen years to realize the fundamental character of the changes that have taken place.

In the days of steam and water power, mechanically applied, we had to depend on line shafts, belts and other cumbersome and inefficient appliances of that time.

However, we could not get along without gears, partly because of their positive character but also for effecting greater speed reductions within relatively compact dimensions and for turning corners.

When the electric motor was first introduced people were still thinking along the lines of the old group transmissions and it became merely a question of substituting one kind of loss for another without much actual economy in the cost of power delivered to the various machines. More gears were required because the inherent economical speeds of electric motors were higher than had been necessary with the earlier prime movers.

The early attempts at gear reduction (we still hear of them!) were nothing but groups of open spur and bevel gears of varying degrees of imperfection assembled with common shafts and flat boxes with enough disregard for the fundamentals of gear efficiency and permanence to bear a strong family resemblance to some of the products of a schoolboy's "mechanno" set.

It became gradually evident that the logical way in which to obtain the full advantages of electric power was to discard the old "group" system of mechanical transmission in favor of the individual motor drive, using one motor to one machine or even one motor for each section of a machine, depending on the kind of machine.

It is natural for any new development to begin by following the lines of established practice. Most industrial machines have to be driven at lower speeds than can be obtained direct from any motor. Much stress was laid on the facility with which an alternating current motor, taking standard 60 cycle current, could be furnished to run at any one of eleven different speeds ranging from 257 to 3600 r.p.m. You had only to choose the most convenient speed and hook up your motor through a belt or texrope drive supplemented, maybe, with a simple pair of gears. People mistrusted high speed motors, partly from habit but, perhaps, with some reason at that time.

However, the unsatisfactory character of the old mechanical transmissions created a demand for something better. It had to be more compact and more efficient.

The spur gear reducer made its appearance at about that time. It usually took the form of a planetary or "nested" train of gears enclosed in a box and self-lubricated. The input and output shafts were generally in line. This was a decided advance over the old style of hap-hazard transmission, its disadvantages were mainly due to the imperfections of spur gears, to the complications of internal construction and to difficulties in the way of proper lubrication and cooling.

Helical Gearing

In the meantime, the advantages of the helical principle in gearing had become more generally known. The pioneers of the helical gear industry, few in number at the time, had been occupied almost to capacity with the heavier applications, steel mills, mines, rubber mills and marine turbine propulsion. So the manufacturers of helical gears entered the speed reducer field. In a very short time they succeeded in demonstrating that the helical principle offered the same advantages in the smaller speed reducers as in heavy major drives. It may be well to describe just what these advantages are:

(1) Tooth engagement is always continuous if the gears are designed with due regard for the principles involved and if the precision character of the workmanship is commensurate with the purpose in view. There is no shock due to sudden transference of load from one gear tooth to the next.

(2) The limiting number of teeth in any pinion is far less than with spur pinions, while at the same time, the reduced stress on individual teeth permits finer pitches.

(3) The proper performance of spur gears depends on the exact conformity of the tooth contour to a definite curve, usually the involute. The form is unstable and changes with wear. This is one reason why spur gears often become more noisy with use.

In helical gears the tooth form is less critical and they will function satisfactorily under safe loads provided that any deviation from an involute curve through the pitch point lie inside the curve, not outside. It is a matter of considerable difficulty to produce uniform involute curves in gear teeth on a commercial scale; it is, fortunately easy to satisfy the required conditions when generating helical gears. Moreover, provided that loading is held within safe limits, the helical gear will improve with initial wear and will become quieter with use.

The practical advantages that follow are: From (1) Helical gears can be operated quietly and without vibration at much higher speeds than spur gears. Speeds as high as three miles per minute are used in some large marine turbine gears. From (2) Higher individual gear ratios can be used within more compact dimensions. From (1) and (3) We get maximum efficiency and life.

Thus the helical principle, applied to speed reducers, has eliminated the objections to the high speed motor from the point of view of mechanical transmission.

It did not take the motor manufacturers long to realize the advantages of concentrating on one or two motor speeds instead of eleven.

The user had to be sold on the idea that a motor of small or medium size could operate with the same reliability at 1800 r.p.m. as at 1200 or 900 or 600.

There are still a few "die-hards" in every industry but, in the main, the economy of the high speed motor in efficiency, power factor and first cost has led to its general adoption.

Incidentally, it may be said that the cost of a modern helical speed reducer or motoreducer depends much less on the total gear ratio than on the torque to be delivered at the output shaft. Unlike the worm gear, there is very little loss of efficiency with increase in ratio, usually less than the gain in the motor.

* Presented at the meeting of the Lake States Section of the Technical Association of the Pulp and Paper Industry, Appleton, Wis., Jan. 8, 1935.

Not long ago every manufacturer of these specialties could set his own ratings on his products. This led to some abuses under the stress of intensive competition.

It is one thing to frankly cut the price of a given piece of equipment, that merely reduces the manufacturer's margin to a point that may easily fall below the deadline of cost. The purchaser may take advantage of the situation, for a time, without much risk, but he has to face one of two possibilities. Eventually the quality of the product will suffer from the necessity to cut the cost to meet the price or that particular manufacturer will go out of business and leave obsolete equipment on the purchaser's hands. The more insidious and dangerous form of chiseling from the purchaser's standpoint is to overstate the capacity of the equipment which is offered. The obvious remedy is to establish a definite and scientific basis for rating speed reducers and Motoreducers.

Somebody had to start the movement so the Falk Corporation, original pioneers of the helical gear industry in this country, undertook the task. It took more than two years of careful testing and many months of technical research to reach a practical formula which could be relied on as a basis for design and comparison. The results were given in a paper by our W. P. Schmitter which was read before the American Gear Manufacturer's Association last summer and subsequently published in more complete form in *Machine Design*.

Since that time the rules for design and rating have been condensed, as far as possible, to meet the more specialized requirements of speed reducers and motoreducers and have been adopted by the A. G. M. A. as standard practice. The great majority of reputable builders of helical gear reducers have accepted this basis of rating so that, in the near future, it will be possible to purchase speed reducers and motoreducers which are definitely stamped with their A. G. M. A. ratings computed on a uniform scale.

The ratings take into consideration such variables as the quality, strength and hardness of materials used in the gears and shafts, the safe capacity of the bearings, regardless of type, and such modifications as may be due to differences in principles of design, rigidity of supporting structure, etc.

It will no longer be necessary to question the size of a bearing or the diameter of a shaft. So far as is humanly possible with standard units designed to cover a wide range of gear ratio and consequent torque, every part of a reducer is designed for equal capacity to every other part, when unavoidable discrepancies exist *the rating is based on the weakest link in the chain.*

Purchaser's Choice

The intending purchaser may well ask, at this point: "What is left to me, except price, as a basis for choice between one make and another?"

The answer to this question is about the same as it has always been.

The experienced engineer considers the details of design and its adaptability to his purpose. Simplicity of construction, accessibility of parts for quick removal or repair, and, above all, careful attention to proper lubrication, are points for major consideration.

Then there are the 'intangibles.' The rating formula assumes one general standard of quality in workmanship. The purchaser must consider this point in the light of his own or his neighbor's experience because different standards will inevitably exist. An established reputation for prompt service with financial and technical responsibility will always enter the picture.

There are still some elements of technical controversy in the reducer business. The purchaser's engineer must decide on the rival claims of the single helical and double helical gear, of ball and roller bearings versus plain bearings, and of speed reducers versus motoreducers or, as they are sometimes called, Gearmotors.

The manufacturer who specializes exclusively in double helical gears will proclaim their superiority for every purpose; the single helical specialist will offer equally specious arguments in favor of that type; the advocates of several different kinds of ball and roller bearings will insist on the exclusive excellence of their own products—while all will unite in condemnation of the sleeve bearing whose origin is so antequated that few engineers have even troubled to follow its modern progress. The proponents of the motoreducer will convey the impression that the independent speed reducer is a dead letter. But it will be found, on analysis that these arguments are just sales propaganda; what is needed is an unbiased review of the facts.

Now the Falk Corporation does not specialize in any one type but manufacturers them all with equal facility. Taking all kinds of helical reducers into consideration it is probably the largest builder of standard units in the world. As a consequence it may be assumed, with fairness, that our opinion on these controversial matters is not based on expediency but rather upon a desire to choose what is best for each particular purpose. I will endeavor to explain our reasons for such variety of choice.

Single Helical Versus Double Helical Gears

Both types, when properly designed, satisfy the helical principle in gearing, in that respect they can be considered equal. The single helical gear produces an unbalanced end thrust and transmits it through the rim and arms to the shaft, to be neutralized by a suitable thrust collar or conical roller or ball bearing. The pinion produces an equal but opposite thrust which is transferred to a thrust bearing on the pinion shaft. Both of these unbalanced thrusts eventually reach the gear box frame which must be stiffened to resist them without appreciable deflection. The value of each of these unbalanced axial forces, neglecting friction, is equal to the product of the tangential or driving force and the tangent of the helix angle. However, since the helix angle of a single helical gear need only be about half what is necessary to secure correct helical action in a herringbone gear, the thrust is seldom so large that it cannot be taken care of by conical roller bearings of the same or nearly the same capacity as would be required, anyway, for the tangential load. I have heard it argued that this unbalanced force tends to deflect and distort the gear by deflecting the rim to one side, considering it as a cantilever based on the hub and shaft. This could be true in a very extreme case but in practice it is merely a question of correct design and can be ignored. Fundamentally, the single helical pinion is more sensitive to load concentration from torsion and deflection than the double helical pinion, which has the effect of imposing stricter limitations on the ratio of face width to diameter and reduces the practical limit of gear ratio at fixed centers. Now the double helical or herringbone owes its origin and existence to a desire to neutralize the unbalanced end thrust of the single helical gear while retaining the advantages of helical action.

The tangential tooth load is divided between two helices of opposite hand. The axial forces are still, present

usually to a greater degree because the helix angle is larger, but they are divided into twin forces of opposite hand which are neutralized by tension or compression within the gear rim, and have no reaction on the shaft, bearings or frame.

We have chosen to use double helical gears exclusively, in parallel shaft speed reducers of the independent type, for the reason that there seems to be no logical excuse for introducing unbalanced axial thrusts and for neutralizing them in special bearings when it isn't necessary and serves no useful purpose. In all reducers of this type, single, double or triple reduction, only the final or output shaft is axially fixed by thrust collars or bearings which also serve as protection against external thrust from the driven side. All the other shafts are mounted in parallel roller or sleeve bearings without axial restraint of any kind. This is the only correct principle for mounting double helical gears because it permits automatic balance of axial forces and so insures equal division of tangential load between the two helices. Some makers of double helical gears advance the argument that all shafts can be fixed axially. This is unsound in theory and really depends on there being some lateral play in the bearings. If the shafts were really held in tight thrust bearings, it would be necessary to resort to extremely accurate lateral adjustment of the shafts and then the balance of load between the two helices would cease to be automatic, as it should be; you cannot maintain one form of control and superimpose another.

Whenever a helical gear drive has more than one outlet shaft on the same train and these shafts are subject to externally applied thrust, we lock all shafts axially and use single helical gears. There is one type of gear application that may be of interest to the paper industry.

Rod mills are sometimes used for wet-grinding pulp. The action of the rods, climbing and falling, causes rapid and rather violent fluctuations of torque. Such mills are generally driven by a motor and helical speed reducer followed by a pinion which drives a bull gear which encircles the shell of the mill. If a spur gear is used for the final drive the vibrations are magnified and transmitted back through the speed reducer. If a herringbone gear is used the 'free' pinion sometimes oscillates with considerable vibration, noise and consequent wear. We have found the single helical gear with axially fixed pinion the best solution to this problem. This illustration is merely given to show that both types of helical gear, single and double, have special advantages in different cases but that neither of them can justly claim superiority under all circumstances.

Right Angle Drives

The Falk Corporation manufactures a very complete line of speed reducers for right angle drives. The first reduction is always a pair of spiral (helical) bevel gears. When two or more trains are required, we use single helical gears for the remainder. There is a sound reason for this preference. Those who are familiar with precision spiral bevel gears know that the maintenance of accurate adjustment is of paramount importance. Both shafts must be located in correct relative positions and locked in place by thrust bearings of the conical roller or ball type of such liberal proportions that they can be depended upon to run for years without appreciable wear. The final or output shaft should also be locked for protection against externally applied thrust. If double helical gears were used for the final reductions, the location of shafts and bearings would have to be adjusted with extreme care and there would still be no guarantee of automatic balance of load between the two helices.

However, let us assume, for the moment, that such a unit is built and correctly adjusted, at the factory, by a staff of mechanics whose life work is to assemble and adjust this kind of equipment. It is then sold to a manufacturer whose interest in gears begins and ends with their ability to give him uninterrupted and trouble-free service. Later on he may have trouble with one of his roller or ball bearings, such things are known to happen! This may mean dismantling the unit, replacing one or more bearings with complete readjustment. His maintenance and repair crew may be of the finest, but the diversity of their work makes it impossible for them to have the same experience in this specialized work as the people at the factory. Furthermore, supposing that he prefers to play safe and send to the maker for assistance; the factory is probably hundreds of miles away and the right service man may not be available at the moment; this may cause costly delay to production besides adding to the expense of what should be a simple repair job.

But the use of single helical gears changes the whole picture. Besides the assurance that axially locked shafts will never prevent the load from being distributed over the entire tooth face, it is a comparatively easy matter to replace and adjust a bearing since it is only necessary to set it to correct running clearance, the axial location of the helical gear and its shaft can be anywhere in reason, which means within a sixteenth of an inch or so.

Falk right angle reducers are made in two types, horizontal-horizontal and horizontal-vertical. The former type is often used in the modernization of sectional drives on paper mills which are belt driven from a common line shaft; the other type is specially adapted for pulp bleachers and vertical agitators; the output shaft is always vertical but the take-off can be from the top or bottom, whichever happens to be most convenient. Drives of this type must usually carry heavy thrust loads on the output shaft. Single helical gears are of advantage in such cases because the gear thrust reaction can be made to oppose and partly neutralize the external thrust, to the relief of the thrust bearings.

Falk motoreducers use single helical gears for a different reason. In principle this motoreducer is the same as the Falk speed reducer, since it includes one, two or three simple pairs of helical gears on two, three or four shafts. However, the primary excuse for the motoreducer lies in its compact, space saving construction, sweetened by low initial cost which mostly disappears in the larger sizes.

The most compact motoreducer is known as the integral type in which the first pinion is mounted directly on the motor shaft. The motor shaft, in a standard high speed motor is locked, axially, in ball or roller bearings. The output shaft must be locked for protection against external thrust. Again we follow our conception of correct principle and use single helical in preference to double helical gears. There is another reason for this choice. The frame of the motoreducer is designed to match the contour of the motor, it is not split across the common plane of the shafts like the independent speed reducer. Assembly must be made from the ends, there is no room to lift the gears out of mesh. It would be a difficult matter to assemble double helical gears in a frame of this type, but single helical gears slide into mesh from the ends just as easily as spur gears.

In passing, I would like to call your attention to the possibility of substituting precision single helical gears for the customary spur gears used to couple the dryer rolls on large paper machines. Roller bearings are becoming popular on modern machines and can take care of the end thrust from the gears. Double helical gears are unsuitable

because they cannot be assembled in mesh and also because axial location are fixed. Single helical gears would insure quiet, vibrationless operation at maximum speeds.

Bearings

The Falk line of helical geared speed reducers, in its present form, was originated about fifteen years ago. At that time roller and ball bearings were much more expensive and less plentiful than is the case today. So it seemed to us worth while to explore the possibilities of the sleeve bearing for this service. We had not thought of entering the right angle field, so our problem was to produce an efficient and durable line of parallel shaft reducers involving single, double and triple gear trains. The sleeve bearing is an extremely efficient and reliable instrument provided that it is made with reasonable care and accuracy and is designed to correct principles. In a parallel shaft speed reducer there are from two to four shafts, each of them supported in two bearings. The life of the gears depends on the maintenance of parallelism between these shafts.

If each of a pair of similar sleeve bearings is equally loaded, it is reasonable to expect equal wear; if the loading is kept within proper limits and correct lubrication is assured, there will be very little wear at all. To insure equal loadings, the bearings in Falk parallel-shaft reducers are symmetrically arranged, in pairs, about the common center plane of all of the gears. In double and triple reductions this means that one pair of gears is divided and arranged with one half on each side of the others, instead of setting the gears side by side. The lubrication of gears and bearings is automatic, with the Falk (patented) trough system of distribution to the bearings it is ideal for sleeve bearings. On the other hand, it is only fair to say that ball and roller bearings have been developed to a high state of perfection. Many thousands of them are used in Falk speed reducers and motoreducers, they are indispensable in the latter and for the right angle reducer. To meet the preference of some of our customers we manufacture a complete line of parallel shaft speed reducers with roller bearings throughout, the dimensions are the same and prices are nearly equal.

It would be cheaper to drop the sleeve bearing, get on the bandwagon and concentrate on one model, with roller bearings. Why don't we do it?

Because we regard the speed reducer as being primarily a piece of equipment for continuous industrial service, where the most expensive single item of operating cost is loss of time caused by shut-downs for repairs. The simpler and more accessible the reducer can be made, the greater the convenience and speed of repairs in the rare cases when they are necessary. Sleeve bearings are made in halves, they can be replaced in a few minutes. Roller and ball bearings must be mounted over the ends of the shafts, everything outside must be removed and replaced, pressfits of pinions, sprockets or couplings are not likely to be improved by the process.

Speed Reducer Versus Motoreducer

The speed reducer requires more speed than the motoreducer because it is built for continuous heavy-duty service and designed with no other consideration. The motoreducer has been produced to perform some of the functions of the independent speed reducer within the smallest possible dimensions. The same materials are used in both types.

Motoreducers are invaluable for many of the lighter industries, such as laundries, bakeries, distilleries and for light conveyor work, but in those industries which require medium power with practically continuous operation the independent speed reducer deserves preference for all except the lightest jobs.

Falk independent speed reducers are in service on upwards of one hundred large paper machines with separate motors for each section.

Lubrication plays a very important part in the operation of any type of reducer. In general, the independent speed reducer holds several times the volume of lubricant that can be accommodated in the more compact motoreducer.

The majority of gearmotors and motoreducers are built on the 'integral' system, in which the motor frame is attached directly to the gear frame, while the first pinion of the reducer is mounted on the motor shaft which is made 'special' for that purpose. Alignment between motor shaft (with pinion) and the rest of the gear train depends on machine work which is usually performed in separate shops, there are no means for adjustment. The motor cannot easily be changed or be removed for repairs and replaced by another motor of standard form. To overcome this disadvantage and yet retain the compact character of the motoreducer, we have added to our line the 'all-motor' type. The motor is independently mounted on an extension to the gear frame. All of the gears, shafts and bearings are assembled within the gear box, just like the independent speed reducers. The motor can be lined up accurately and is provided with a shock-cushioning Falk flexible coupling, there is no dependence on machine work. The motor can be removed for repairs and even changed for another size, speed or make without having to dismantle or disarrange the gear box. This system has been developed for both vertical and horizontal motoreducer, it is becoming very popular with those who prefer the 'motoreducer' type of unit. Up to this time it is an exclusively Falk product.

Lubrication

Falk speed reducers and motoreducers are rated for capacity when lubricated with standard mineral oils of high grade. The operating bulletin gives our recommendations and a wide range for selection. Experience has shown that several of the modern 'E P' (extreme pressure) lubricants will give greater capacity and endurance to the gears.

It is suggested that the selection of reducers should be made on the basis of straight oil lubrication, keeping the extra capacity with special lubricants in hand as insurance and in case the load proves to be greater than expected. Those who are familiar with these lubricants know that there is sometimes a tendency to deposit solids in the lubricating troughs and passages, requiring periodic inspection and cleaning. However, periodic and thorough inspection is only incidental to prudent operation and maintenance.

All horizontal speed reducers and motoreducers are lubricated by the automatic splash system. All vertical reducers require and use the forced (pumped) system. The standard vertical drive, when the output shaft drives downward, is provided with a special 'leakless' umbrella type of oil seal, no gland or trick seal can be depended on for this location.

Couplings

All modern flexible couplings are designed to neutralize the effects of slight misalignment between the connected shafts. Axial freedom is another general feature. The Falk-Bibby coupling has the additional and important property of cushioning shocks and impacts. This coupling is recommended for all general purposes but is especially

valuable where shock loads are to be expected, such as on chippers, grinders, hogs and drum barkers. When used with speed reducers, a shock absorbing coupling is most effective on the low speed or output shaft.

Selection of Speed Reducer

In conclusion I would like to suggest a few simple rules for the selection of a speed reducer or motoreducer:

(1) Estimate the actual load as closely as possible.
(2) Select the nearest standard gear ratio from the manufacturer's table. Do not demand a special ratio (not listed) unless absolutely necessary, it will cost more and may cause considerable delay in shipment.
(3) Multiply the estimated load by the correct 'service factor' which will be found in the manufacturer's bulletin.
(4) Select the reducer with the minimum capacity given by (3), don't choose a unit that has a smaller rating but do not pick one that is much oversize, it will be less efficient and will cost more for power.
(5) Don't consider price in selecting the best lubricant. Good reducers are never expensive to lubricate, a poor lubricant is the worst kind of economy.
(6) When in doubt, consult the manufacturer. His advice is probably interested, but it is always at your service.

George W. Sisson, Jr., Lauds Court

[FROM OUR REGULAR CORRESPONDENT]

GOUVERNEUR, N. Y., July 2, 1935—"Thank God for the nine old men," declared George W. Sisson, Jr., president of the Raquette River Paper Company, in referring to the recent decision of the Supreme Court affecting NRA during an address before members of the local Chamber of Commerce. He listed courage, risk, foresight and capital as the factors necessary to an efficient functioning of business and said that the qualities most needed in developing and carrying forward business cannot be legislated into existence. Social security was described as a desirable goal but one which could not be achieved by government regulation or codes in his opinion. The complexities of business development were briefly analyzed by Mr. Sisson who pointed out that new business and new expansions of business originated in the private initiative of business men, rather than in the government. In speaking of industrial relations, the Recovery Act, and industrial problems in general, he declared that although reference had been made to the country going back to "the horse and buggy age" as a result of the Supreme Court ruling against NRA he felt that the "horse and buggy age" was a good one.

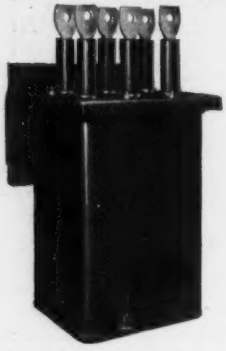
Harrisville Gets Low Accident Record

[FROM OUR REGULAR CORRESPONDENT]

HARRISVILLE, N. Y., July 2, 1935—Word received here this week ranks the Harrisville Paper Company, a subsidiary of the St. Regis Paper Company, with the lowest accident rate for mills of its size in this country and Canada during the period from 1932 to 1934. Notification was received by W. P. Rooney, safety engineer, from the National Safety Council at Chicago. The report also stated that the Watertown branch of Taggart Brothers rated the largest reduction in reported accidents since 1932, an improvement of 43 per cent, as well as the largest improvement in the severity rate of accidents, equal to 97 per cent. All plants under control of the company have been self-insured under the Compensation Act since last July.

Small Oil Blast Circuit Breaker

An oil blast circuit breaker especially applicable where space is limited, such as in industrial plants and other stations, has been announced by the General Electric Company. Designated as Type FK-42, it is rated 600 amperes, 7500 volts; 800 amperes, 2500 volts; and 25,000-kv-a. interrupting rating. All designs are double- and triple-pole single throw, with all poles in a single rectangular welded plate steel tank. Provision is made for mounting directly back of panels, or in switch houses or metal-enclosed switchgear. They may be manually or electrically operated.



Features of the new FK-42 breaker include: Compact construction; silver-to-silver main contacts protected by arcing contacts, providing long life and low maintenance; oil blast baffles assuring high speed interruption with short arcs and minimum oil deterioration; sturdy Herkolite bushings giving high mechanical and dielectric strength; single tank for all poles, saving time during inspection and giving compact, space-saving construction; frame and tank completely fabricated of plate metal, with all joints electrically welded; internal mechanism with entire absence of external moving parts, increasing clearance and facilitating connections; and simple and positive internal mechanism construction, assuring long life, ease of maintenance, and high speed operation.

A complete line of accessories, including overcurrent trip coils, both instantaneous and inverse time delay (for manually or electrically operated breakers), undervoltage devices, auxiliary switches, steel supports, etc., will be available.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 3, 1935—The Government Printing Office has received the following bids for 36,000 pounds of rope manila paper; Reese & Reese, Inc., 10 cents per pound; Old Dominion Paper Company, 11.6 cents; and Whitaker Paper Company, 9 cents.

For 5,000 sheets of mourning letter paper; Z. & W. M. Crane, Inc., at $32.50 per M sheets; R. P. Andrews Paper Company, $12.35; Whitaker Paper Company, $13.65; Barton, Duer & Koch Paper Company, $24.50; and Mathers-Lamm Paper Company, $20.90 and $12.71.

For 5,525 pounds of buff sulphite index paper; Mathers-Lamm Paper Company, 6.25 cents per pound; R. P. Andrews Paper Company, 6.79 cents; Whitaker Paper Company, 6.79 cents; and Old Dominion Paper Company, 6.84 and 6.99 cents per pound.

Swedish Ground Wood Market Unfavorable

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 3, 1935—Work may be stopped at several of the small mechanical pulp mills in Sweden during the present quarter owing to unfavorable conditions in the ground wood market, according to recent reports from Acting Commercial Attache Osborn S. Watson, Stockholm. A mill at Amotfors, in Varmland, has already been closed down, and notice has been given two other mills that unless conditions improve the plant will be closed down.

● **INFINITELY VARIABLE SPEED ACCURATELY CONTROLLED**—Any desired speed between 5 and 750 r.p.m. is secured accurately, instantly and smoothly by simply turning handwheel which varies stroke and delivery of multiple piston type pump. Additional adjustments permit speeds up to 2500 r.p.m. Hydraulic, mechanical or electrical remote control can be substituted for manual control shown.

● **REMARKABLY EFFICIENT**—Power required is always a minimum regardless of load because torque is automatically controlled and there is no throttling or bypassing of the oil. No V-belts and pulleys or speed reducers are required.

● **DIRECTION OF ROTATION**—Both A-End and B-End can be provided for rotation in either direction; this can later be changed on the job without difficulty or additional parts. Units can also be provided with mechanism for instantaneous change of direction.

● **CAPACITY**—Units in stock have maximum output of 6 h.p. continuous duty at 1000 lb./sq. in. and 7½ h.p. intermittent service at 1250 lb./sq. in. Larger units available later. Safety valve set at 1500 lb./sq. in.

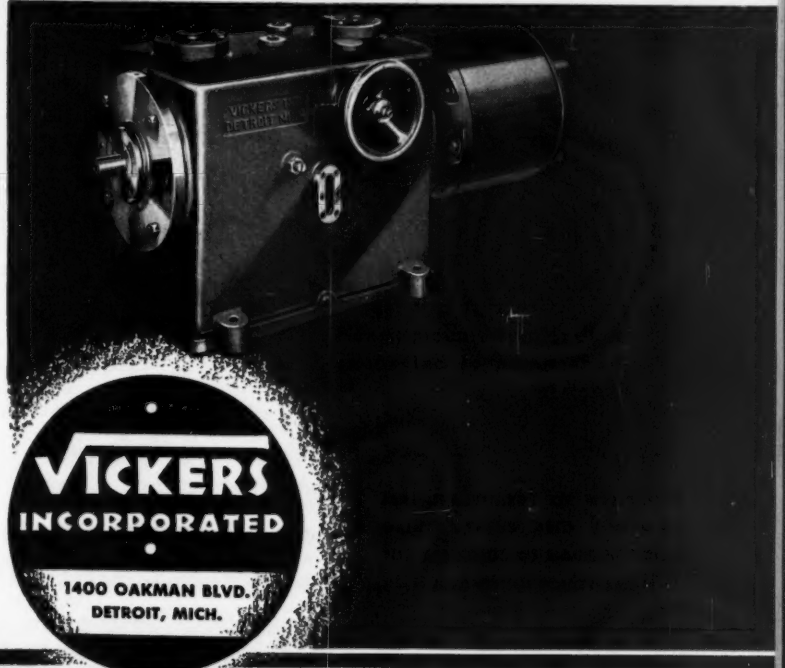
VICKERS *Hydraulic* VARIABLE SPEED TRANSMISSION

● **COMPACT AND SELF-CONTAINED**—No exposed working parts or piping; being totally enclosed, transmission is unaffected by moisture or dirt in atmosphere. Overall dimensions of the 6 h.p. and 7½ h.p. unit shown are 25⅞" x 17⅛" x 17½"; these can be varied to suit individual requirements.

● **PROVED PERFORMANCE**—This transmission has been in commercial use for more than 4 years under a wide variety of difficult conditions. It is in no sense experimental. Because oil is the fluid, all working parts are self-lubricating.

● **DRIVE**—Direct connected 1200 r.p.m. motor which is less expensive than slower speed motors; no V-belts and pulleys or speed reducers need be used with motor drive.

For additional features, dimensions, description of operation, etc., ask for Bulletin 35-T8.



VICKERS
INCORPORATED
1400 OAKMAN BLVD.
DETROIT, MICH.

The Technobugs

(Respectfully dedicated to Ernst Mahler and Harry P. Carruth)

Recited by J. L. Fearing of International Paper Company at a meeting of the Book Paper Manufacturers Association in Chicago, June 24, 1935.

The era of the Scientist
Is coming on apace
'Tis said that soon the Salesman
Will fall away from grace.
Great modern paper TECHNOBUGS
Have crawled from their cocoon!
They tell me that old salesmanship
Will hit the ashcan soon.

The Technobug, true Technobug
Post graduate must be
Of Prague, Cornell or Czernowitz
Or good old M. I. T.
To keep my product even
He'll check it on the spot!
With strengthoscope and densoscope
With stretchoscope and glario
With Thwingoscope, colorio
And others I've forgot.

The Technobugs are teaching me
To instrument each run
So closely that each fiber
Shall look and act as one.
They say that their new formulae
Will purify the soul
Protect me and preserve me
With grade and price control!

I'm told that if some customer
Should get up on his ear
These Technobugs will go right up
They'll mount the Stratosphere!
With forests, rivers, climates
Obedient to their nod,
These Technobugs of future years
Will talk with none but God.

EPILOGUE

Now Ernst, old bug, and Harry too!
I prithee, make it clear:
If *Customers* hire Technobugs
Where do we go from here?
If Technobugs *Fight* Technobugs
Who'll act as referee?
Why hesitate? Just nominate
The Laureate of Eye Pee!

To Sell Paper Mill Supplies in the South

Gene Bechard has started an agency for selling supplies to the paper mills in the South. He will represent the following lines:

Eastwood, wires; Wm. E. Hooper and Sons Company, driers and felts; American Wringer, rubber rolls, and Ohio Knife Company, cutter knives and chipper knives.

Mr. Bechard has been with the Eastwood-Nealley Corporation for eleven years, the last four as sales manager.

For the present he will make his headquarters at 110 Oakridge avenue, Nutley, N. J., but later expects to be located in Atlanta, Ga.

Recent Trade Literature

Copies of the trade literature noticed below may be obtained gratis by writing to the companies at the addresses mentioned.

COMPENSATING WHOLESALE PAPER SALESMAN. Metropolitan Life Insurance Company, 1 Madison avenue, New York. Describes the individual compensation plan of thirty paper wholesalers. This report has been made available for general distribution because it is believed that the contents may be of interest to executives confronted with similar problems. The report aims to present factually the methods and practices of business men in meeting the particular problem considered.

BENTONITE TECHNOLOGY AND INDUSTRIAL USES. American Colloid Company, 363 West Superior street, Chicago, Ill. Includes a number of new bulletins containing much matter that is new and which has hitherto been unpublished.

FROM FOREST TO PLATE. Keyes Fibre Company, Graybar Building, New York. A recently published catalog covering the moulded pulp plates and dishes manufactured by the Keyes Fibre Company for which the John M. Hart Company acts as manager of sales.

ELECTRIC AND POWER TRAVELING CRANES FOR PAPER HANDLING. Whiting Corporation, Harvey, Ill. A pamphlet which describes and illustrates modern handling in paper mills.

QUICK-SETTING ACID-PROOF CEMENTS FOR ACID-PROOF TANK AND TOWER CONSTRUCTION. The United States Stoneware Company, 50 Church street, New York. Bulletin No. 801 which has just been issued and is said to be the most comprehensive treatment ever accorded the subject of quick-setting acid-proof cements for acid-proof tank, acid-proof tower and acid-proof floor construction.

Indianapolis Demand Improves

[FROM OUR REGULAR CORRESPONDENT]

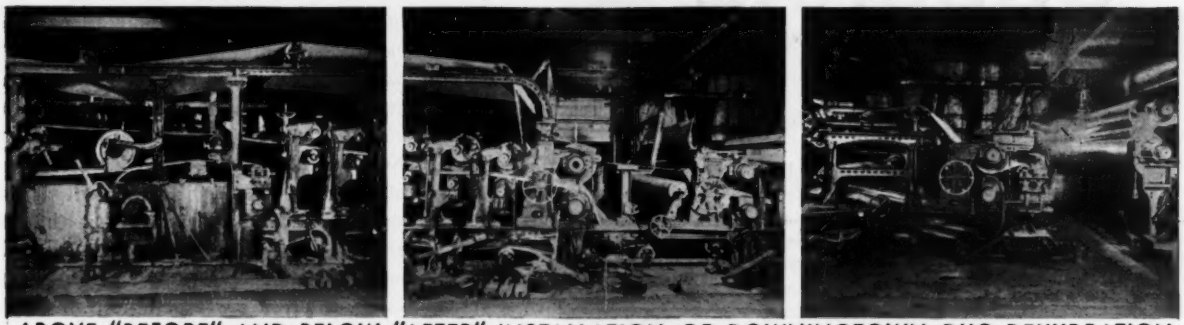
INDIANAPOLIS, Ind., July 2, 1935—Paper demand in most lines continues fair. The big increase during the last week has come in summer specialties, which after a delayed spring, have come to the front in a big way. Anticipating a big demand this week for the holiday the retailers got in the market last week with some real volume business. All lines, including plates, cups, napkins and other items moved with a rapidity that was gratifying to the trade. Prices are firm and whole stocks seem ample at the present time.

The fine paper market is holding firm. Prices seem well held and there is a fair demand. Some local jobbers say the demand for books and covers coming from the printing trade shows some inclination to increase, but due to a late spring a lot of business was lost because of lack of direct mail advertising due entirely to unseasonal influences.

Common papers are moving nicely. Most of the trade was interested in the French Lick convention and predicted a lot of good would come from it. Wrapping papers were moving nicely last week. There was a good demand for bags, particularly from the cleaning trade, but other users also were more or less actively in the market. Prices are firm with no indications of changes.

Box demand has been rather dull during the last week, according to local manufacturers. There has been a slight decline in demand from the automobile accessory industry, but the textile industry continues to be a good customer. Prices are fair, thus far there having been seen no signs of a disposition to cut prices since NRA went out. It is pretty generally believed here that there will be no price changes on this account.

DOWNINGTOWN



ABOVE "BEFORE" AND BELOW "AFTER" INSTALLATION OF DOWNINGTOWN DUO-DEHYDRATION

at Container Corp. of America, Chicago

Patented

Extractors and Duo-Dehydration are covered by Downingtown Patents Nos. as follows:
1,996,661—1,992,713
RE 19,521—1,935,837
1,991,346—1,934,543
1,911,310—1,998,046

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ORDERLY MARKETING OF NEWSPRINT

From Ottawa it is announced that an amendment to the Natural Products Marketing Act which has been given a first reading in the House of Commons, is expected to provide machinery whereby producers may, if they choose, co-operate in a scheme for the orderly marketing of newsprint under the provisions of the act. The amendment which defines "natural product" in broadened terms, after enumerating various products, includes this new wording: ". . . and such article wholly or partly manufactured or derived from a product of the forest as may be designated by the Governor-in-Council."

Discussing this new development, the Financial Times, of Montreal, says:

"Representatives of the newsprint interests and Premier Taschereau of Quebec both have in the past, warned that, failing an agreement among the mills to maintain a reasonable price structure, resort to the Natural Products Marketing Act would ultimately be the only solution.

"It would be extremely unfortunate for the newsprint industry in Canada, as well as for the federal and interested provincial governments, and the thousands of workers employed in this important Canadian industry, if it should be found necessary to bring the distribution of newsprint under the Marketing Act. Government regulation makes for unhealthy and artificial conditions in any industry, but, in the case of newsprint, there is the fact that the great bulk of Canadian produced newsprint is absorbed by the United States publishers. Any suggestion that the Federal Government in this country was assisting in keeping up the price of newsprint would be certain to antagonize the powerful publishing interests in the neighboring country, already very much disgruntled at the intervention of the Quebec Government in the situation.

"Whatever individual views may be on the propriety of efficacy of the Marketing Act, it is not difficult to understand the advocacy of government regulation of marketing in the fruit-growing, lumbering, and other industries that have already been brought under the operation of the Act. Where there are thousands of small organizations and individuals engaged in an industry, orderly marketing under unfavorable trading conditions is difficult of negotiation among the producers themselves. In the case of the newsprint industry, however, with more than 90 per cent of the Canadian output represented by about half-a-dozen large producers, there would appear to be no insurmountable excuse for failure to achieve an agreement on a reasonably profitable price for the product, more especially with relation of consumption to productive capacity so much more favorable today than two years ago.

"The United States publisher has some justification for attacking the entry of a Canadian government into the price situation on newsprint. He would, on the other hand, have little or no excuse for objecting to Canadian newsprint producers taking such steps as would insure for themselves a reasonable profit on their output."

THE PROPOSED CORPORATION TAX

Judging from all indications, the wealth-sharing tax program of President Roosevelt, so far as it relates to corporations, will draw an increasing storm of protest from leading industrialists and financiers. This protest seems likely to be of a striking character should there be strong indication of the program being enacted in its present form.

Along these lines, the proposed graduated tax upon the net income of corporations is described by the National Association of Manufacturers as "unsound from whatever aspect it is considered" and as "an attack upon the welfare of millions of consumers and upon millions of thrifty people who have invested their savings in our business corporations."

In a statement analyzing the effects of the proposed legislation upon the country and its harmful effects upon the millions of small shareholders, the Association says:

"The proposal for a graduated tax upon the net income of corporations, the corporation with a large income to have a higher tax rate upon its income than the rate at which a small corporate income is taxed, is unsound from whatever aspect it is considered.

"As an income producing measure it is inadequate. Under the rate schedule suggested by the Senate Finance Committee it has been estimated that the graduated corporation income tax would raise between $40,000,000 and $100,000,000 additional revenue a year—an amount equal the continuing federal deficit for from one to two weeks of the year.

"It is admittedly a proposal designed to facilitate redistribution of wealth; it is, in other words, a reform measure and not a tax measure. By adding new tax burdens, by proposing unsettlement of relationships between corporations and their stockholders, it is, in fact, an anti-recovery measure.

"This is not a small problem involving only a small number of corporations, with large incomes. The proposal affects millions of persons. A corporation is simply

an aggregation of individuals who have invested in the same enterprise. There are nearly 10,000,000 registered owners of common stocks listed on the New York Stock Exchange and additional millions of owners of companies listed on other exchanges or not dealt in on any security exchange. Even allowing for duplications of stock holdings there remain millions of Americans who are part owners of business corporations.

"There is a greater diffusion of ownership and wealth in the United States than in any other country. It is now proposed to levy higher taxes upon the corporation in which there is the greatest diffusion of ownership. The result would unquestionably tend toward a decreased number of small investors in large corporations and thus toward increased concentration of wealth ownership, an objective contrary to the announced aims of its own sponsors.

"Corporations are not simply large pools of wealth; they are owned by great masses of individuals. The average individual investment in corporations is $2,700, with millions owning less. These investors have every right to expect and demand that the government shall treat them fairly and without discrimination.

"As representatives of industrial management we point out that a graduated corporation income tax is unfair to millions of stockholders since the rate of tax suggested bears no relation to the percentage of profit earned on the investment, and since it taxes the millions of small investors in corporations having large incomes at a higher rate than either large or small investors in small corporations.

"A graduated corporation income tax is, moreover, a penalty on efficiency. It says, in substance, that whenever a corporation makes a sufficiently good product to attract customers and earns a substantial profit, it shall be taxed more than the corporation with less customer demand and smaller profits.

"If a graduated corporation income tax had been in effect the past thirty-five years, the full results of scientific and business efficiency would not have been realized, and our automobiles, vacuum cleaners and electric refrigerators would today cost much more than their present prices.

"The graduated corporation income tax proposed is primarily a reform measure, would be inadequate as a revenue producer, penalizes small investors in successful companies and would increase living costs with resultant lower living standards. It is an attack upon the welfare of millions of consumers and upon millions of thrifty people who have invested their savings in our business corporations."

Fox River Paper Co. Files Tax Appeal

WASHINGTON, D. C., July 3, 1935—The Fox River Paper Company, of Appleton, Wis., has filed an appeal with the United States Board of Tax Appeals because of an overassessment of its income taxes for 1932 amounting to $5,892.92 by the Bureau of Internal Revenue.

Weekly Production Ratio Report

Reports to the American Paper and Pulp Association show the following Over-All Production Ratios for the designated periods.

	Reporting Mills		Total
	Number	Capacity	Production Ratio
September, 1934	292–299	.....	59.4%
October, 1934	297-394	.....	64.7%
November, 1934	385–399	.....	61.7%
December, 1934 (a)	396–404	.....	62.1%
January, 1935	397–411	.....	65.8%
February, 1935	407–409	.....	70.0%
March, 1935	406–408	.....	70.5%
April, 1935	405–407	.....	70.0%
May, 1935	371–407	.....	69.3%
*Week ending June 8, 1935..	368	150,226	70.5%
*Week ending June 15, 1935.	356	145,770	70.4%
*Week ending June 22, 1935.	271	109,716	69.7%

Statistics showing the number of mills reporting by ratio groups are given below:

	Number of Mills Reporting Week ending		
Ratio Limits	June 8, 1935	June 15, 1935	June 22, 1935
0% to 50%	122	116	91
51% to 100%	246	240	180

* Subject to revision.

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours" were as follows:

September, 1934	62%
October, 1934	63%
November, 1934	56%
December, 1934 (a)	53%
January, 1935	61%
February, 1935	67%
March, 1935	67%
April, 1935	61%
May 4, 1935	61%
May 11, 1935	61%
May 18, 1935	59%
May 25, 1935	61%
June 1, 1935	57%
June 8, 1935	61%
June 15, 1935	65%
June 22, 1935	65%

(a) Capacity and percentage data exclude December 25, 1934.

Revised statistics covering delinquent mill returns will be shown in later reports.

Australia May Have New Paper Industry

An industry to produce paper mainly from Australian eucalyptus is under consideration in Australia, Trade-Commissioner E. C. Squire, Sydney, advises the Department of Commerce. Recent local announcements, he points out, state that an expenditure of £1,000,000 in the next two years is contemplated for this purpose.

Two large Australian corporations are said to be interested in this proposition as well as a group of individuals who have rights to property and timber interests in Tasmania.

A well-known paper-making expert and engineer has been carrying on research work and experiments for several months and is said to have reported favorably upon the commercial prospects of making pulp and fine papers in Tasmania and other States, the report states.

The two corporations and the private group referred to have signed an agreement to make a final survey of the expert's reports and to establish the industry if the results of the survey confirm present indications of satisfactory proposals, Mr. Squire reported.

Three sites are under consideration as the location of the factory, one in Southern Tasmania, one in New South Wales and one at Burnie, in Northwestern Tasmania. It is probable that the last-named will be finally chosen.

It is estimated that the completion of the first section of the work will occupy from 18 months to two years, a period in which work will be provided for a large number of men. After that, permanent employment will be available for many men and women, it was stated.

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Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Paper Specialties

Process for the Manufacture of Printing Paper. Karl Winkler. Mon. Papeterie Belge 14: 395, 397 (June, 1934).—Printing paper is made in three plies, the central ply being highly sized and impermeable to ink.—A. P.-C.

Surface-Filled Paper. Donald B. Bradner assignor to The Champion Coated Paper Co. Brit. pat. 403,852 (Jan. 4, 1934).—An uncoated paper suitable for use as a book paper contains mineral matter such as calcium carbonate and adhesive such as casein concentrated in the surface depressions (the amount of mineral matter being not greater than about 1 lb. per side per 1000 sq. ft. of surface).—A. P.-C.

Printing Paper. Carl Winkler. Fr. pat. 760,062 (Feb. 16, 1934).—A printing paper for books, journals, etc., is composed of an interior layer impermeable to printing ink and covered on either side by a layer sensitive to ink.—A. P.-C.

Carbon Paper. Martin Bandli. Fr. pat. 761,575 (March 22, 1934).—Carbon papers are made by mixing cellulose derivatives with dyes dissolved in oleic acid or fats and absorbent fillers such as carbon black, and mixing the paste thus obtained with a solution of a substance which acts as an insulating substance for the oleic acid or fat and which, in the dissolved state, is not soluble in the oleic acid or fat used or in the solvent or plastifiers of the cellulose derivative used. Such insulating materials include viscose, glucose, cellulose nitrates soluble in alcohol, alkali silicates, agar-agar, gelatin, glues and resins.—A. P.-C.

Note on the Cause of Fiber Orientation in Paper. J. A. Robertson and F. W. Bailey. World's Paper Trade Rev. 101: 1003-1006, 1040, 1042 (March 30, 1934).—Comparative strength tests in the machine and cross directions of papers taken at various points on the machine and made under identical conditions with and without shaking the wire indicated that, while the shake produces better distribution of the pulp (as indicated by greater strength of paper made with shake), there is increase in strength of the sheet in passing from the wire to the reel, particularly during the passage of the paper over the driers, the increase being only slight in the cross direction and considerable in the machine direction.—A.P.-C.

Two-Sidedness. Ivar Ekholm. Paper Mill. 57, No. 17: 13 (April 28, 1934).—A very brief discussion of the causes and elimination of two-sidedness in paper.—A. P.-C.

Process for Manufacturing Carbon Papers. Armand Deplanche. U. S. pat. 1,972,011 (Aug. 28, 1934).—Heated copying material in liquid form is applied to one face of a strip of paper; the paper is then passed around a heated roll with the uncoated surface in contact with the roll to dry the paper, while a scraper is pressed against the coated side to force the copying material into the body of the paper and at the same time remove the excess of copying material.—A.P.-C.

Glassine Paper. Leroy D. Frisbie assignor to Westfield River Paper Co., Inc. U. S. pat. 1,970,227 (Aug. 14, 1934).—In order to produce glassine paper of uniform transparency, immediately after it has been moistened by spraying the paper is passed over a roll having a soft covering (*e.g.*, of felt) which serves to distribute the moisture very evenly throughout the sheet.—A.P.-C.

Impregnated Sheet Products. George A. Richter assignor to Brown Co. U. S. pat. 1,972,055 (Aug. 28, 1934). A dried, porous, bulky sheet, made entirely or largely of substantially unbleached wood pulp purified to an alpha-cellulose content of at least 93 percent., is impregnated with asphalt heated to about 300° to 350°F.—A.P.-C.

Method of and Apparatus for Producing Roofing Elements. Marius S. Darrow assignor to The Barber Asphalt Co. U. S. pat. 1,972,133 (Sept. 4, 1934).—A heated knife or knives are provided in any usual form of shingle-cutting machines, so that the bitumen at the cut edges will be rendered relatively fluid by the heated knife and will seal the edges.—A.P.-C.

Method of Producing Wall Paper. Joseph B. Fleming assignor to Fleming and Sons, Inc. U. S. pat. 1,973,-339 (Sept. 11, 1934).—Ornamental designs are printed on the paper as it leaves the calenders, a looping mechanism or similar device being provided between the calenders and the printing rolls.—A.P.-C.

Instrumentation in Brightness Grading*

By Myrl N. Davis[1]

The General Electric Reflection Meter (better known in the paper industry as the "Brightness Tester") holds a far more important position in the testing and particularly in the grading of pulps and papers than one would be led to believe from the dearth of information published concerning it. The writers propose in this paper to present a fairly complete description of the instrument, to cover in some detail the precautions necessary to insure accuracy of the results obtained by use of the instrument and to attempt a formal definition of the "brightness" of paper which will make that quality a little less a coefficient measured by a particular instrument with particularly peculiar characteristics and a little more of a physical property.

Origin of the "Brightness" Test

In the two or three years preceding November, 1933, each of the writers spent most of his time building, using and attempting to interpret and apply the data obtained by the use of instruments for estimating the color of "white" book papers. Each discovered that when two samples of paper were compared visually and by means of the reflectances to various colors of light it was found almost invariably that the "brighter" of the two samples reflected the higher percentage of blue light. [The term "brightness" as it will be used in this report appears to be peculiar to the paper industry. It is probably closely approximated by, if not synonymous with, the term "whiteness" used with reference to white textiles (*1*). It appears to be much more closely associated with the quality purity than with the quality brightness as the latter two terms are used in spectrophotometric colorimetry (*2*).]

Reflectance to Blue Light

When, in November, 1933, the first attempt was made to find a correlation between the results of a wide variety of physical tests upon and the cost figures relating to a great many samples of uncoated book paper, it was found that the reflectance of the papers to blue light was one of two physical properties (other than furnish) which showed such a correlation.

In November, 1933, the first attempt was made to find physical tests which might be used as criteria for the separation of uncoated book papers into groups according to cost. Suitable physical tests would be required to group all uncoated book papers manufactured in the United States into the same groupings as did the prices quoted by the manufacturers at the time of submission of the samples for testing. Only two physical properties were found to be even closely associated with the cost of the papers tested. One of these properties was the reflectance of the papers to blue light. The other was goodness of formation. Both properties were selected by the Grading Committee of the Book Paper Manufacturers Association as physical qualities upon which to base a system of paper grading.

There is little occasion for surprise that the term "brightness test" was immediately applied to the measurement of the reflectance to blue light and that the instrument for making that measurement for the purposes of paper grading came to be known as the "brightness tester" before anyone, including the writers, had more than a vague idea of what the instrument would be like. Since that time the term "brightness" has been used almost exclusively (in the pulp and paper industry) as applying to the result of a "brightness test." The adjectives "brighter" and "brightest" are applied at the will of the user to samples judged by physical or visual grading. Fortunately the two judgments are rarely found to disagree and then only by small amounts.

The Institute of Paper Chemistry, Appleton, Wis., was commissioned to make the business arrangements for the manufacture and distribution of instruments to be used in brightness testing. The writers were given the task of preparing specifications which must be met by the finished instruments and of designing or overseeing the design of the brightness testers. Quite naturally, acceptance or rejection of the new instruments was very largely left to their judgment.

Grading Uncoated Book Papers

The decision to attempt the use of the brightness test in the grading of uncoated book papers was made on November 16, 1933. The first model of the General Electric Reflectance Meter was delivered to the Institute of Paper Chemistry on December 21. On January 16, 1934, the Institute of Paper Chemistry, in collaboration with the writers, was able, not without some misgivings, to present to the Book Paper Grading Committee a complete set of brightness data on all samples of uncoated book papers presented for test. From this data the official brightness values for grade separation were adopted and the brightness scale was thereby officially fixed. Since that time the writers' connection with brightness testing and with the brightness tester has been advisory in character. The work (of which an enormous amount was involved) of calibrating, distributing and servicing brightness testers and the responsibility of maintaining the brightness scale in its proper position has all been assumed by the Institute of Paper Chemistry.

It must not be assumed that all of the problems involved in brightness testing were solved in the few weeks prior to the presentation of the first set of brightness data. Some of the toughest problems had been encountered and solutions which probably would work evolved, but several other equally tough problems had not even presented themselves. It is very much to the credit of the Institute of Paper Chemistry and, in particular, of George C. Munro, who was in direct charge of the technical phase of the work, that the brightness tester and the brightness grading have proven successful.

Description of General Electric Reflection Meter

The General Electric Reflection Meter is designed to compare the intensity of the light reflected, after 45 degree incidence, in a direction normal to the surface of the sample, with the intensity reflected under identical conditions by some arbitrarily chosen standard reflectance. By the use of colored light filters the comparisons are confined to each of several fairly narrow portions of the spectrum.

The comparison is accomplished by the successive adjustment of the intensities of the light reflected first by

* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, N. Y., Feb. 18 to 21, 1935.
[1] Member TAPPI, Physicist, Kimberly-Clark Corporation, Neenah, Wis.

the unknown and then by the standard reflectance, using a shutter of continuously variable but known aperture until a photoelectric cell-amplifier arrangement gives some standard response, indicative of the equality after passing the shutter of the known and unknown light intensities. In such an instrument the sole duty of the photocell is to give equal responses to equal light intensities over relatively short periods of time, while that of the amplifier is to give equal responses to equal photoelectric currents over the same periods of time. The accuracy of measurement of the relative intensities of light reflected by unknown and known reflectances depends upon the geometry of the optical system and the accuracy with which the calibrated shutter is constructed.

Schematic Arrangement

Fig. 1 shows, in schematic form, the optical and electrical system employed in the G. E. Reflection Meter. The path of the light is as follows:

From the light source (a 50 c.p. automobile headlamp bulb) light passes through a condenser lens and after passing through a filter containing a solution of copper sulphate (a layer 7mm. thick of a 10 per cent solution of $CuSO_4.5H_2O$ in distilled water and enclosed in a pyrex cell) is brought to a focus on the surface of the sample at the opening. That portion of the light reflected in the solid angle subtended by the lens is collected by a lens, passes through the shutter of variable aperture, through another lens, through a filter, and is brought to a focus at or near a diaphragm. This diaphragm is of such size and so positioned that no light from a narrow annular region near the edges of the sample opening or from outside that region can get past the opening. The light passing the diaphragm just described enters the photocell housing and falls upon the light sensitive portion (cathode) of the photocell. The entire optical system has been designed so that no light which has not followed the path just described can enter the housing of the photocell provided only that the sample cuts off all light which might enter through the sample opening.

A second photocell is so placed that it can receive whatever light is passed by a second shutter of variable but not calibrated aperture which is illuminated directly from the light source. This second photocell will be referred to henceforth as the dummy cell as distinguished from the measuring photocell first mentioned.

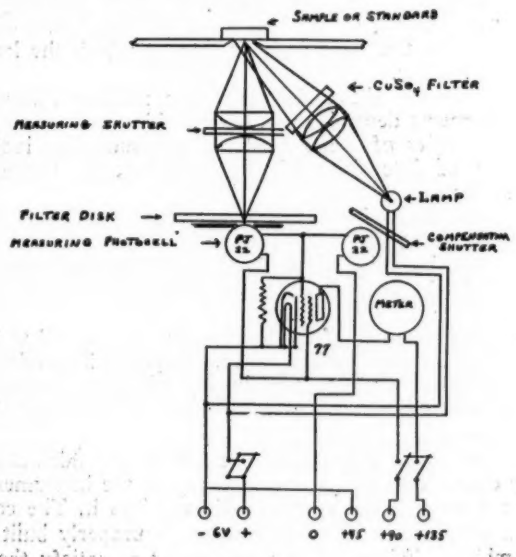

Fig. 1.
Schematic diagram of reflection meter.

The Photocells

Electrically, the two photocells, dummy cell and measuring cell, are connected to the amplifier tube in such a way that the latter responds only to differences in the intensities of the lights incident upon the two photocells. A microammeter in the plate circuit of the amplifier tube indicates the response of that tube to the voltages imposed upon it by the existing differences in photoelectric current. Using such a system of two photocells and amplifier tube it is possible to subject each photocell to light intensities exciting the emission of photocurrents which would, taken alone, cause the needle of the plate current meter to go far off scale. However, since only the difference in photocurrents affects the amplifier tube and since that difference can be brought to any arbitrarily chosen value by adjustment of the auxiliary shutter, the meter needle can be brought to any desired position while the sensitivity attained by the large photocurrents (and large current measuring resistance) is retained.

An additional advantage gained by the use of the dummy photocell arises from the fact that since the light intensities (as measured by the photocurrents produced) striking the two photocells are almost equal and since any change in the intensity of the light source will make equal percentage changes in the photocurrents produced in the two cells, a fluctuation in intensity of the light source will have little or no effect upon the reading of the microammeter.

Power for the light source and for the filament of the amplifier tube is derived from a six volt storage battery. The plate circuit of the amplifier and the two photocells receive potential from 135 volts of ordinary radio B batteries.

At no time has a serious attempt been made so to design the instrument that power from the alternating current mains could be used. Time did not permit such an enterprise during the early period of design and later experience has not fostered the hope that the change to AC power could readily be made.

The Brightness Filter

In describing the history of the brightness test we have repeatedly described the quantity to be measured as the reflectance of the sample to blue light. We must, of course, be more specific. The light filter used in the brightness test is an Eastman Wratten (gelatine) No. 49 light filter. This filter was chosen for several reasons:

1. Its transmission centers in the region known by previous experience to give, in the case of pulps and white papers, reflectance values in general agreement with visual judgments of brightness.
2. While the filter transmits light in the extreme red end of the spectrum and in the near infra-red (as do almost all blue filters) that transmission is so located that the light which would be transmitted can readily be removed from the incident light by use of a filter containing a 10 per cent solution of copper sulphate.
3. Despite the fact that this filter is made up of a sheet of dyed gelatine sealed between two glass plates, its stability and reproducibility is attested by the fact that it has been possible to interchange almost a dozen of these filters varying in age from a few weeks to five years without detectable change in the brightness values obtained on any of a considerable number of samples. We understand that the experience of the Institute of Paper Chemistry in putting into calibration more than thirty G. E. Reflection Meters has justified our confidence in this filter.

The Filters

The filter used in the brightness test is mounted, together with eight other filters transmitting various colors of light, in a large wheel controllable from the panel of the instrument. Any one of the nine filters can be used in reflectance measurements, giving, if all filters be successively used, a series of reflectance values for colors of light scattered throughout the visible spectrum.

The filters included in the set are shown in Table I, together with the visually observable transmitted color and the approximate position of the center of transmission in the wavelength (of light) scale.

TABLE I

No. on Panel	Filter Designation	Color	Center of Transmission
1	Eastman Wratten No. 49	Blue	450
2	Corning Glass Doublet	Violet	400
3	Eastman Wratten No. 76	Blue-violet	432
4	Eastman Wratten No. 75	Greenish-blue	490
5	Eastman Wratten No. 74	Green	531
6	Eastman Wratten No. 73	Yellow	574
7	Eastman Wratten No. 72	Orange	604
8	Eastman Wratten No. 71A	Red	650
9	Eastman Wratten No. 70	(Too far in infra-red to be useful.)	

At this point it must be stated that there has never been a serious attempt to calibrate the reflection meters sent out so that all instruments will check on all other filters with accuracy comparable to that obtained when the brightness filter is used. The instrument was built primarily for the measurement of the reflectance to the light passed by the brightness filter, and careful calibration was reserved for that filter alone. (No instrument is permitted to go out without examination to insure that measurements made using the extra filters have the proper characteristics.) The additional filters were included in the design at a time when it was hoped that checks on any one filter would insure checks on all others. Since these filters are often useful in estimating the color differences between two samples, the practice of building them into the brightness tester has been continued despite the fact that the instruments cannot be consistently made to check from one to another on all filters simultaneously.

Photoelectric Cells

The photoelectric cells used are specially selected, by the Institute of Paper Chemistry, in order that all measuring photocells shall have almost identical color sensitivity. The tolerances with regard to color sensitivity from cell to cell are so slight that scarcely one photocell out of ten manufactured can be used in the measuring position in the brightness tester. Tolerances for the cell used in the dummy position are sufficiently greater so that no difficulty is experienced in filling the dummy positions with cells which are not quite suitable for use in the measuring position. (The above statement must not be taken to imply that the cells rejected by the above tests are unsuited to the normal uses for photocells. That is not the case. The accuracy required of the brightness test simply imposes very severe conditions of an unusual type which must be met by the photocells to be used in this particular application.)

The Shutter

The shutter, which furnishes the means of controlling the intensity of the light striking the measuring photocell after reflection from the sample, consists of two concentrically mounted brass discs: one fixed in position; the other rotatable about its center. Each disc may be considered as being a two-spoked wheel, the spokes being slightly more than complete opposite quadrants of a circle. By rotation of the one disc about its axis one is able to superpose the spokes of the two wheels so that two quadrant shaped openings are left free. Further rotation reduces the size of the free openings until, finally, the spokes of the moving disc completely cover the openings in the fixed disc and no light at all can pass through the wall furnished by the two discs. The edges of the spokes are very carefully machined so that closure of the two openings occurs at a definite angle, and so that the area of the opening, for any other position of the movable disc, is strictly proportional to the angle through which the disc has been turned from the point of exact closure.

The rim of the movable shutter disc is cut so that this disc acts as a gear wheel driven by another gear mounted rigidly on the shaft of a dial wheel on the panel of the reflection meter. A one to one gear ratio is thus maintained between rotation of the dial and rotation of the shutter disc.

The dial is divided into 117 uniform divisions covering the range of positions of the shutter disc from complete closure (zero on the dial) to almost complete opening. If the zero of the dial has been properly adjusted to correspond exactly to exact closure of the shutter, the dial reading for every other position of the shutter will be an exact measure of the area of the openings in the shutter.

Reading of the dial is facilitated by the presence of a vernier scale. The dial can be read to three significant figures for all readings above 9.9. A slow motion control makes it possible to set the dial to any particular position with ease.

Principle of Making Reflectance Measurements

The process of making reflectance measurements using the shutter just described is very simple. With the unknown reflectance in place, the shutter dial is set to the reflectance value of the standard reflector for the filter in use. The auxiliary diaphragm (controlled by a dial located on the left hand side of the instrument panel) is adjusted until the needle of the microammeter assumes some position in the center of the meter scale (indicating an approximate balance between the photoelectric currents flowing in dummy and in measuring photocells). The reading of the microammeter is noted carefully and the sample removed from the sample opening and replaced by the standard reflector. The shutter dial is then readjusted until the meter needle assumes exactly the same position it held when the unknown sample was in place. The new reading of the dial gives the reflectance of the unknown on the same scale as that on which the known reflectance lies.

The scheme above described for making reflectance measurements depends upon several things:

1. Identity of meter readings is assumed to indicate identity of intensities of light striking the measuring photocell;
2. The area of the shutter openings is assumed to be proportional to the dial reading;
3. The intensity of the light passed by the shutter is assumed to be proportional to the area of the shutter opening;
4. The intensity of the light source is assumed to have remained constant during the time required in making the measurement; (use of the dummy photocell makes less severe the requirements as to constancy of intensity of the light source).

Of the above assumptions the second and third are the only ones which couple the accuracy of the instrument to the accuracy of the workmanship put into it. The conditions will be met if the instrument is properly built and assembled. Failure of any instrument to satisfy the demands of these two assumptions is easily revealed and is

quite unlikely to escape detection during inspection by the manufacturer and calibration by the Institute of Paper Chemistry.

Any failure of the assumptions with regard to the constancy of the plate current of the amplifier or the constancy of the light source over short periods of time will inevitably reveal itself by fluctuations in the reading of the plate current meter and by the failure of successive reflectance determinations to repeat themselves.

Confidence in the ability of photometric system to make proper and accurate comparisons of the intensities of the lights reflected by standard and unknown samples is thus justified to within the limits of accuracy (which may be checked at any time) imposed by the mechanical arrangement, by the constancy of the meter reading, and by the sensitivity to small changes in light intensity of photocell-amplifier-meter system.

Effective Wavelength at Which Reflectance is Measured

When the reflectance of any sample is being measured using any one of the filters, the photoelectric current produced in the photocell is equal to the sum over all wavelengths of light of the products $rSIT\Delta\lambda$ where

S is the sensitivity of the photocell to unit energy of light of wavelength λ;

I is the energy of the light emitted by the light source in a wavelength band of width $\Delta\lambda$ and of mean wavelength λ;

T is the grand product of the transmissions for light of wavelength λ, of all media through which light from the source must pass on its way to the measuring photocell; and

r is the reflectance of the sample to light of wavelength λ.

The maximum value of photocurrent which could ever be observed is obviously that found when a colorless sample of reflectance, $r = 1$ for all wavelengths is under measurement. This maximum value is given by the sum over all wavelengths of the product $SIT\Delta\lambda$ and is, of course, equal to the area between the wavelength axis and the curve of SIT in a plot of the latter quantity against wavelength.

A plot of the curve rSIT against wavelength will, of course, take a different shape for every different function r of the wavelength. Here, again, the area under the curve will be equal to the photoelectric current observed when the sample is in position on the reflectance meter.

The reflectance measured by the reflectance meter is, for any sample, proportional to the ratio of the area under the curve rSIT for that sample to the area under the curve SIT. It is thus a weighted average of the value of r throughout the region for which SIT is greater than zero. How much does this weighted average r tell us about the value of r at a particular wavelength?

Let us define the effective wavelength of the filter in question as being the wavelength coordinate of the center of gravity of the area under the SIT curve. It may be shown that, if the plot of r against wavelength for a particular sample can be represented over the region for which SIT is greater than zero by a straight line, the value of r is exactly equal to the reflectance r taken at the effective wavelength of the filter regardless of the slope of the straight line.

In general the curve of r against wavelength can only be approximated by a straight line for any wavelength region. However, that approximation becomes better and better as the width of the region is reduced. Thus the value of r becomes a better and better approximation to the value of r taken at the effective wavelength as the SIT curve is confined to narrower and narrower regions. The ideal filter to use, from this point of view, would transmit only over a very narrow band of wavelengths as in the case of a well built spectrophotometer. However, in the case of "white" papers the reflectance curve can usually be approximated with reasonable accuracy by a straight line over relatively wide wavelength bands. It is this fact which makes it possible to give a more definite meaning to the results of reflectance measurements made with an instrument of the type under discussion than the statement that somewhere in the region for which SIT is greater than zero the value of r is equal to the reflectance observed.

In view of the foregoing discussion we can with fair confidence plot the reflectances observed with the various filters of the General Electric Reflection meter against the effective wavelength of the respective filters. A smooth curve drawn through the points on the plot should be a fairly accurate representation of the value of r throughout the spectrum. It will be obvious that the more irregular the curve which has to be drawn, the less dependable are the observed values for the points in the vicinity of the irregularity.

In Fig. 2 we have plotted the course of three straight lines through the region for which SIT is greater than zero. The horizontal line, A, corresponds to the curve which would be given by any completely colorless (white or gray) sample. All wavelengths are reflected equally well. The line, B, with positive slope is characteristic of most "white" papers. Line, C, is characteristic of a few "white" papers and many white diffusely reflecting glasses.

The effective wavelength of the filter is indicated by the solid vertical line and two positions to which the effective wavelength might possibly be changed by changes in S, I or T indicated by the dotted vertical lines. This plot enables us to visualize just what changes in the measured reflectance are to be expected if shifts of the effective wavelength to right or left are permitted to occur.

It will be seen that no possible shift of the effective wavelength can affect to the slightest degree the reflectance observed for a truly colorless material.

In the case of all samples for which the slope of the reflectance curve is positive, a shift of the effect wavelength to the right will increase, and a shift to the left decrease, the observed reflectance r.

Conversely, if the slope of the reflectance curve be negative, an increase in effective wavelength will decrease

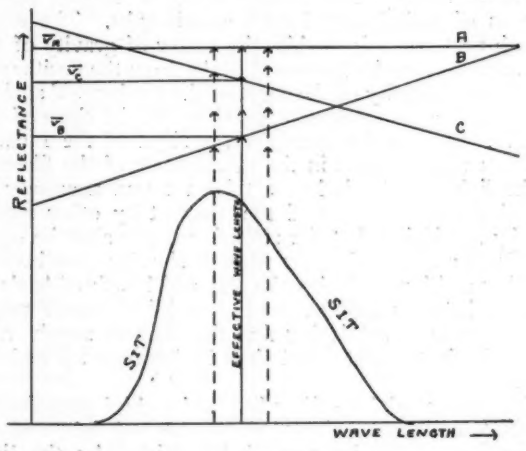

FIG. 2.

Diagram showing effect of shifts in effective wave length on the observed for reflectance of a colorless and two slightly colored materials.

the value offer, while a decrease in the value of the effective wavelength will increase the value of r.

In every case the magnitude of the changes in r is independent of the magnitude of r but is directly proportional to the slope of the line representing r as a function of wavelength.

The above reasoning, which holds exactly for all substances for which r may be represented within the region in question by a straight line, holds approximately for all samples for which a straight line is even a very rough approximation. We will find that the argument leads to an effective scheme for determining whether or not the effective wavelength of the brightness test has changed position, and if a change has taken place, in what direction a correction must be applied.

Factors Affecting Calibration of Brightness Testers

The foregoing discussion shows us rather definitely what procedure must be followed at the Institute of Paper Chemistry in order that each General Electric Reflection meter shall check in brightness readings with all others in use to within some prescribed limit of error. First, steps must be taken to insure that the shape of the curve of SIT against wavelength shall be similar for all instruments. Secondly, it must be established that the effective wavelength for the brightness filter is sufficiently close to identical with that of all other brightness testers so that the instrument will give satisfactorily accurate results over the range of colors of papers in which the brightness test is of importance.

The shape and position on the wavelength scale of the SIT curve is, of course, most profoundly affected by the shape of the curve of transmission of the brightness filter against wavelength. Fortunately, the stability and reproducibility of the brightness filter has been such that no difficulty in calibration of any new or used reflection meter has been traceable to the brightness filter.

The next most important factor in its effect on the shape of the SIT curve is the color sensitivity of the photoelectric cell used. The S curve is sufficiently variable from cell to cell so that only about one photocell in every ten manufactured can be used as a measuring photocell in a brightness tester.

The shape of the I curve (energy emitted by the light source as a function of wavelength) may be represented for a new headlamp bulb and in the region of transmission of the brightness filter plus copper sulphate filter by an almost straight line sloping upwards toward higher energies of emission at longer wavelengths. The effect of such an I curve is to shift the center of gravity of the SIT curve toward longer wavelengths from the position of the center of gravity of the curve of the product ST against wavelength by an amount proportional to the slope of the I curve. Despite the fact that the slope of the I curve increases with increase in the temperature of the filament of the light source, it has not been found necessary to control the temperature of the filament by other means than by specifying that the reflection meter shall be operated from a storage battery without simultaneous booster charging and by specifying the size and length of leads to be used between storage battery and instrument panel. This amounts to specifying that the filament supply voltage at the instrument panel shall lie between 5.6 and 5.7 volts.

The copper sulphate filter has as its chief purpose the reduction of the intensity of the visible red light and the elimination of the infra-red light emitted by the light source. It happens that in addition to the blue light transmitted by the brightness filter, there also exists a band of wavelengths in the infra-red transmitted by this filter. This red light, which would otherwise destroy the usefulness of the brightness filter is eliminated by use of the copper sulphate filter. In addition the copper sulphate very effectively protects the samples of paper under test from the heating which would be inevitable were not most of the heat from the light source eliminated from the light before it strikes the paper.

If the filter is properly prepared the only effect which the copper sulphate filter can have upon the shape or the effective wavelength of the SIT curve arises from a slight absorption which occurs in the region of blue transmission of the brightness filter. This absorption is, of course, a function of the concentration of copper sulphate in the filter. It has the effect of shifting the effective wavelength with relatively little change in the shape of the SIT curve.

Since the copper sulphate filter has a rather important effect upon the shape and the effective wavelength of those filters with effective wavelengths in the yellow and red regions of the spectrum, it has not been thought advisable and has not been found necessary to alter the concentration of the solution in this filter in order to adjust the effective wavelength of the brightness filter in putting new instruments into calibration.

Calibration Maintenance

One of the most annoying and most disappointing phenomena observed by the manufacturers of fine instruments is the fact that almost without exception no instrument can be depended upon to exhibit, after a short time, in the hands of the owner, one-half the accuracy inherent in the design and construction of the instrument and present at the time of its delivery by the manufacturer. In many cases the loss of accuracy just mentioned is never suspected by the user for the very good reason that he has available no means of recalibration except an expensive overhauling by the manufacturer. So long as the precision of the instrument remains satisfactory, the user is unlikely to have an instrument overhauled.

The brightness tester is no different from other fine instruments with regard to its tendency to drift out of calibration. In the case of the brightness tester, however, economic pressure requires that correct calibration be maintained to within some definite limit of maximum inaccuracy. In this respect the brightness tester differs from almost every other paper testing instrument (for which good precision is commonly more necessary and certainly more frequently attained than any high degree of accuracy).

Maintenance of the accuracy of the brightness test requires that some system of checking be set up by which the owner of a brightness tester may always be sure that the results of tests made using his instrument will be reliable.

Maintenance of the desired degree of accuracy among all brightness testers has been one of the major problems faced by the Institute of Paper Chemistry in its capacity as a standardizing laboratory for brightness testing. The problem has been solved almost completely by resort to a system in which the Institute of Paper Chemistry sends out, periodically, samples of paper whose brightnesses have been carefully determined, as well as carefully calibrated brightness standards. The paper samples used in this system are chosen in such a way that they offer a relatively severe test of the accuracy of any brightness tester. The operator of a particular instrument, as his share of the work of maintaining the accuracy of his instrument, is expected to make use of the material sent him as a means

of checking his instrument against those in use at the Institute of Paper Chemistry. If he finds his instrument to be inaccurate, the economic importance of the brightness test will exert sufficient pressure to insure that he will also see that the source of error is found and corrected.

Brightness Testers Get Out of Calibration

The most frequent source of a change in calibration of the brightness tester lies in the automobile headlamp bulb used as a light source. These bulbs appear to be quite uniformly satisfactory when new. However, after they have been used for a while, perhaps 50 hours, a layer of tungsten evaporated from the filament will be found to be collecting upon the glass envelope of the lamp bulb. As this layer of tungsten increases in thickness it tends to absorb more and more of the light emitted by the filament. The absorption of light by the layer of tungsten is selective, blue light being absorbed more rapidly than red. It thus happens that as the bulb becomes more and more heavily coated with tungsten the color of the light incident upon the sample becomes more and more reddish and the effective wavelength of the brightness filter shifts progressively further toward the red end of the spectrum until the result of brightness tests are definitely out of line with the results of tests made using instruments known to be in good calibration.

A shift in the effective wavelength of the brightness filter due to the cause just discussed will cause no error at all in the results of tests on completely colorless samples (for which the curve of reflectance against wavelength is a straight line parallel to the wavelength axis). Such a shift will be accompanied by increases in the brightness observed for all samples for which the reflectance-wavelength curve increases in height as one progresses from shorter to longer wavelengths and will be accompanied by a decrease in observed brightness for samples for which the reflectance-wavelength curve decreases in height as one progresses from longer to shorter wavelengths. This means that the observed brightness will be found to be too high for most paper samples, (the exceptions being an occasional sample of "blue-white" paper for which the correct brightness may be found or even a negative error observed). The pot opal glass brightness standards will usually be found to check satisfactorily among themselves even when the effective wavelength has shifted, unless a bluish white standard be checked against a yellowish white standard, in which case the former will be found to test too low or the latter too high depending upon which is assumed to be correct.

The remedy for the condition whose symptoms have just been described is the insertion of a new headlamp bulb. After the new bulb has been put in place it will usually be necessary to adjust its position until the filament of the light source is imaged in the center of the sample opening at the plane of the top surface of the panel. This done the instrument should be found to check the readings marked on the calibrated paper samples from the latest group supplied by the Institute of Paper Chemistry. Occasionally further adjustment of the focus will be found necessary before the required accuracy of check can be obtained.

For several months one of the greatest worries of the designers of the instrument was that the photoelectric cells used might change in color response characteristics with age. This fear was prompted, in part, by the knowledge of the extreme care with which the measuring photocell must initially be chosen. It is a considerable source of gratification to be able to report that the only case which has arisen in which the photocell has been found to have changed characteristics has been one in which the instrument was enclosed in a case (to protect it from damage during frequent movements from paper machine to paper machine) which very effectively prevented the already none too satisfactory cooling of the instrument case by air convection. In addition a charging circuit for the storage battery had been arranged so that the battery was "floated" fully charged across the line between charger and instrument. This raised the filament supply voltage by some 0.4 volts, thereby increasing the power put into the instrument and thus increased the heating. Finally the instrument was operated for twenty-four hours a day six days a week. The result was the ultimate ruin of the measuring photocell due to continuous overheating. Needless to say lamp bulbs depreciated very rapidly under these same conditions of high ambient temperature and high filament voltage. This is the one case so far encountered in which the measuring photocell has had to be replaced.

While it was attempted to construct the instrument in such a way that it would be subject to a minimum of ill effects from vibration, and while, to those accustomed to the vagaries of similar instruments, this attempt was remarkably successful, it is still true that the instrument should, if possible, be used in places where vibration is not particularly noticeable. Excessive and long continued vibration is almost certain, eventually, to loosen electrical connections and to disturb the alignment of optical parts. The former damage will make itself known by erratic fluctuations of the needle of the plate current meter. Faulty alignment of optical parts will evidence itself by failure of the instrument to check properly, the failure to check usually being almost as much in evidence in the case of the standard reflectances as in the case of paper samples. The difficulty can often be eliminated by a refocussing of the lamp bulb. In more recalcitrant cases the instrument should be returned to the Institute of Paper Chemistry or an expert summoned from that institution to make the readjustments.

It hardly need be added that, if excessive vibration is to be avoided, hard bumps of the reflection meter offer a very real source of danger to its accuracy of calibration. The care with which this instrument should be handled is in every respect similar to treatment which should be accorded to any high class optical or electrical instrument.

Preparation and Handling of Samples

The brightness test consists of the measurement of the reflectance, under specified conditions of illumination and viewing, of a thick pad of the sample under test. A thick pad is most safely defined as being one so thick that, if the thickness be doubled, the results of the test will not be affected. In practice one soon discovers a safe number of thicknesses of paper to use for any frequently measured type and basis weight of paper and prepares his samples accordingly.

The brightness test is performed upon a pile, or tab, of samples cut to the size 2 inches long by 1½ inches wide, the short direction of each sheet being cut in the machine direction of the paper. All sheets in the tab are piled felt side up to insure that, if the sample be two-sided in brightness, the maximum effect of such two-sidedness will be measured. The top sheet of the pile is marked with the designation of the sample, with an arrow to show machine direction (as a check on the direction in which the sample was cut), and with the letter F or W (to show which side the sample cutter thought was up). After preparation, the tab of slips composing the sample is fastened

together with a paper clip until such time as the measurements are to be made. After the brightness has been determined the samples are clipped together once more. Preparation of each sample in this standard way makes possible a uniform system of operation of the brightness tester and facilitates the handling, identification and storing of the samples.

In making the brightness test according to the standard procedure, the dial controlling the position of the photometer shutter is set to give the reading of the brightness standard to be used, the paper clip removed from the sample to be tested, one, two or three of the top sheets moved to the back of the pile and the sample centered face down (felt side down) over the sample opening. The long direction of the tab should extend away from the operator. A one kilogram weight (the proper weight from the set furnished for chemist's trip balances serves admirably for this purpose) is placed upon the sample. The dial controlling the auxiliary diaphragm in front of the dummy photocell is adjusted to bring the needle of the plate current meter to a position near the center of the meter scale. It is well to make sure that the needle adopts its final position moving from left to right. The position of the meter needle is very carefully read off and remembered. The sample is now removed from over the sample opening and the brightness standard put in its place. The position of the brightness standard should be such that the lines ruled on the instrument panel line up with those marked on the back of the brightness standard. This insures that the reflectance of the brightness standard will be that of the point originally calibrated. The dial controlling the photometer shutter is finally rotated until the meter needle comes back to the position it held when the paper sample was in place, again approaching that final position by motion from left to right. The dial reading will now give the brightness of the paper sample directly in per cent.

This test should be repeated not less than five times, one or more sheets being moved from the front of the pile of samples to the back before each test. At the completion of the test the sheet originally on top of the pile (identified by its marking) together with all sheets behind it should be again moved to the top of the pile, (leaving the order of the sheets exactly what it was before the test was begun) and the paper clip again put in place. At all times when the pile of sheets is not clipped together, the pile should be handled by its edges. Measurements should never be made upon top or bottom sheets, nor should the fingers ever be permitted to touch the surface of other sheets in the pile.

It will be quite obvious that any sheet which shows signs of handling either by wrinkles or by even the slightest soiling is not suitable for brightness measurements. Tests made on such paper are strictly unreliable.

The pot opal glass brightness standards should be handled with great care. The slightest carelessness in handling will result in scratches on the surface. These scratches will change the value of the brightness of the standards. It has been the experience of the Institute of Paper Chemistry that a new brightness standard should be sent out for use with each brightness tester every two weeks with the understanding that it be returned one month later. By such a system two recently calibrated brightness standards are always available for use with each brightness tester. At the same time the Institute of Paper Chemistry is enabled to detect and destroy damaged standards before they have become sufficiently altered by scratches to introduce significant error into the measurements made using them.

The one kilogram weight placed upon the sample as the latter covers the sample opening is used to insure that the slips of paper will be packed tightly together and that the bottom slips will lie accurately in the plane of the upper surface of the instrument panel. The necessity of close control over the position of the illuminated surface of the sample is of course a direct result of the conditions of 45 degrees illumination and normal viewing together with the shutter system used. The one kilogram weight is sufficiently heavy to hold piles of even rather stiff sample sheets completely together without at the same time crushing the paper so tightly as to force the bottom surface through the sample opening. The specification of a definite size to which the sample sheets shall be cut insures that the same pressure per unit area will be imposed by the weight upon each pile of sample slips.

The standard brightness measurement is always performed with the machine direction of the sample lying in the plane defined by the axes of projecting and viewing optical systems. This specification was arrived at after a considerable research into the uniformity of results obtained with the sample oriented in various ways.

Standard methods of making brightness tests of handsheets have been worked out and sheets distributed to owners of the instruments. We understand that methods suitable to the handling of powdered materials have lately been worked out and that sheets covering the practice for such materials will soon be forthcoming.

Standards of Brightness

The brightness of the original group of samples tested for the grading committee was tied to the brightness of a particular sample freshly cut from the interior of a block of magnesium carbonate supplied by one of the writers, who had been using another block obtained at the same time for almost three years with no detectable shift in his reflectance scale. The reflectance of this brightness standard was taken as 100 per cent. Several pieces of pot opal glass of known spectral reflectance characteristics were calibrated in terms of the standard carbonate.

It later developed that the magnesium carbonate was susceptible, after exposure to the atmosphere of the laboratory for several hours, to a loss of some three points in brightness. Five minutes' exposure to intense ultra-violet light would produce a similar loss of brightness (identical in maximum amplitude). Such a change would, of course, tend to raise the scale of the brightness test by from two to two and one-half points in the range of brightnesses of almost all white papers normally tested. Fortunately any sample freshly cut from the center of a new block of magnesium carbonate from the same lot seemed always to have the brightness originally taken as 100 per cent.

Since the brightness test was first adopted, an unremitting search has been carried on for a satisfactory permanent working standard for use in the brightness test. The best material so far found is a thick, pot opal plate glass, plates of which can be obtained fairly cheaply, calibrated (much less cheaply), used and discarded before the inevitable scratches can introduce significant error into tests made with their use.

The pot opal plate glass working standards now in use are very slightly yellowish in color (less so, however, than almost all papers). This slight yellowness tends to eliminate a part of the error in brightness tests arising from shifts toward longer wavelengths of the effective wavelength of the filter *so long as measurements are made on samples for which the reflectance increases with increasing wavelength* (this includes practically all "white" papers and pulps).

A very large supply of magnesium carbonate was obtained to be used in checking working standards. This new magnesium carbonate proved to have, when freshly cut and the surface properly smoothened, the desired brightness of 100 per cent in terms of the carefully preserved glass brightness standards originally calibrated and of the working standards and paper samples currently in use at the time that the supply was obtained. Portions of this supply of magnesium carbonate have been distributed to all owners of General Electric Reflection Meters. The rest is being stored at the Institute of Paper Chemistry and used in the calibration of new working standards.

Samples of new working standards out of each batch calibrated are also carefully stored and used only for periodic checks against magnesium carbonate, working standards and paper samples currently in use.

The system outlined above, some form of which has been continued since the start of brightness testing as a means of paper grading, insures that no sudden shifts up or down of the brightness scale can occur without immediate detection. Slow drifts in either direction can escape discovery only if glass, paper and magnesium carbonate samples all change in brightness in the same way and by comparable magnitudes.

The effective wavelength at which the brightness test is performed has been held in place by two forms of check. Every time a brightness tester is put into operation, even for a single test, at the Institute of Paper Chemistry the instrument is "checked in" against a series of paper samples chosen to show up drifts in effective wavelength if present. The new sample is tested on two different brightness testers, each of which has been "checked in." The results of the two tests must be identical to within experimental error. If the results should fail to agree, a third instrument is "checked in" and used as a referee. By such a system a faulty instrument is quickly discovered and put back into calibration. At the present time five brightness testers, four of which may be used for routine brightness testing and the fifth preserved for semi-occasional work in checking the other instruments, are always kept in calibration at the Institute of Paper Chemistry. Every instrument is "checked out" at the close of any half day in which it is used. If the "out" check fails to be satisfactory for any instrument all results obtained by its use since the "in" check are discarded and the instrument recalibrated.

The samples used in this rather complicated checking system range in age over as long a period as the probable permanence of the paper and the state of cleanliness of the sample will permit. Thus only a very improbable series of events would ever permit an undetected shift of effective wavelength, other than an extremely gradual one to occur. The latter possibility is minimized by the fact that some of the originally calibrated glass standards are bluish in hue (the reflectance curve increases towards decreasing wavelength as compared with that of magnesium carbonate), and would show brightness changes in the opposite direction from most other materials tested.

A further and very convincing check on the permanence of the effective wavelength maintained for the brightness test has been obtained by the use of spectrophotometric data upon a very considerable number of samples as a check on the reflectances obtained using the brightness tester. The spectrophotometer used in this work has been a General Electric Recording Color Analyzer very kindly loaned to the Institute of Paper Chemistry by its manufacturer.

In discussing effective wavelength we stated that it could be shown that if the reflectance-wavelength curve could be represented in the region of transmission of the brightness filter (plus copper sulphate filter) by a straight line, then the reflectance of the sample at the effective wavelength should be equal to the reflectance observed by use of the brightness tester. From this it follows that if the effective wavelength be known, and if the scale of the spectrophotometer be the same as that of the brightness test (obtained by using the same primary standard of magnesium carbonate), the values read from the spectrophotometric curve at the effective wavelength should be equal to the brightness observed using the brightness tester.

Initial tests, prior to the official adoption of brightness grading, indicated the effective wavelength to have a value very close to 450 millimicrons. Accordingly, all samples involved in the setting of the official brightness scale were cross checked against the results given by the spectrophotometer at this wavelength. Periodic rechecks against these papers and against others, as well as on new papers, indicate that the effective wavelength has never been allowed to drift away from that automatically adopted when brightness grading went into effect. (There is evidence that just before the first batch of brightness testers was delivered and before satisfactory stable working brightness standards had been secured, the brightness scale was out of position by almost one per cent for a short time. The scale was corrected as soon as the shift was discovered. The evidence that the correction was a proper one and that the present scale is the one originally adopted is very convincing.)

Precision and Accuracy

The precision attainable with the brightness tester may be considered as being measured by the spread in brightness readings normally found in a group of brightness readings made by an operator of reasonable skill and experience upon a reflectance whose value can be said to be fixed (such as a sample of paper so manipulated that every reading is made at the same point on the same sheet of the sample, or such as a working standard of brightness being compared with another working standard).

It has been our experience that under the conditions above specified, and with the brightness tester in normally good working order, the spread of the brightness readings obtained in a set of ten duplicate readings will seldom exceed 0.5 point and will usually be confined to 0.3 point or less. The probable error of any one reading out of a set of ten readings will quite consistently be found to have a value no greater than 0.1 point.

The accuracy attained in brightness testing is a little more difficult to evaluate. The best statement of the situation which we can make is that brightness tests made at the Institute of Paper Chemistry are always reported as the average of the results obtained by the use of two instruments, and that if the two sets of results fail to agree by 0.3 points in brightness, both instruments are suspected of being out of calibration until proven otherwise. This will give some idea of the accuracy which is maintained consistently and over long periods of time among a group of several instruments (but not without constant watchfulness on the part of the operators).

The accuracy attained from brightness tester to brightness tester throughout the entire group of owners is such that it may be said with some safety that no operator is permitted (except through his own carelessness) to make brightness measurements with an instrument which fails to check with the testers in use at the standardizing laboratory by more than 0.5 point in brightness. The experience of one of the writers has been that since the bi-monthly

checking service was started, checks on samples graded by the Institute of Paper Chemistry have usually been within 0.2 points in brightness. The occasional time when a new lamp bulb is required brings the figure stated as representative of the accuracy of this particular instrument to 0.4 points in brightness, the limit of acceptable deviation from the standard readings given on the check samples.

Photoelectric vs. Possible Visual Brightness Testers

This description of the General Electric Reflection Meter may appear to have degenerated into a description of the types of difficulty which may be encountered when one attempts to make accurate measurements of reflectance using photoelectric methods. The next conclusion might be that a great deal of grief would have been avoided had visual methods of photometry, using filters, been employed. This paragraph is written, not in justification of our choice of photoelectric as against visual methods, but simply to point out that almost every difficulty encountered in maintaining the calibration of the photoelectric instrument to within the accuracy desired and attained would have to be met in the same form and solved in much the same way were an optical photometer other than a spectrophotometer to be used. The optical problem would be complicated by the fact that, for equivalent accuracy from operator to operator, the eyes of operators would have to be selected for suitable color sensitivity almost as carefully as the photocells have had to be. Finally, determinations of the least observable contrast between lights of the wavelength involved *(3)* indicate that more than twenty repeat measurements per sample would be necessary to duplicate the accuracy attained here with five measurements.

In conclusion we should like to point out once again our own very peculiar relationship to the brightness tester. Essentially it was this: We expressed the conviction based on our separate experience with two dissimilar instruments that an instrument suitable for making the brightness test and capable of the necessary accuracy could be built; we set down what we considered cardinal requirements for such an instrument and when a design was offered by the General Electric Company we gave our approval to it as representing an instrument which, so far as we could see, would work satisfactorily; after delivery of the first model we carried it through a very difficult few weeks; just as the official grading program began we turned over to the Institute of Paper Chemistry the instrument, our own half-formulated plans for much needed improvement of succeeding models and tentative plans for the way in which the instrument was to be used in grading. Since that time we have acted in an advisory capacity and that only occasionally. The major share of the credit for the success of the brightness grading is due to the Institute of Paper Chemistry and, in particular, to the work of Westbrooke Steele and of George C. Munro.

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Losses in Size Making and Observations in the Cooking of Rosin*

By Maxamillian Krimmel[1]

Abstract

It is a well known fact that there are losses in the manufacture of rosin size milk in any hot process.

These losses are considered from a theoretical standpoint involving the results of analysis of raw materials and the composition of rosin soaps.

The details of a practical method for measuring actual losses are given as are also the results of the method when applied, from which it is evident that in this particular case the predicted loss and the actual loss are in close agreement.

A study of the effect of time variation in saponification yielded some interesting but not conclusive results.

In the conversion of rosin into rosin soap and rosin size milk, there are certain losses of material that are interesting and at times significant from a cost standpoint. This applies to some extent to all methods of conversion but particularly to those processes, involving the melting of rosin and "cooking" with alkali.

While the main purpose of this paper is to give the results of a mill scale test to measure the total loss of material in the preparation of rosin size milk, it might be well to give some consideration first to the probable losses. This will afford an opportunity to make a comparison of theoretical with actual losses.

This study of losses in size making was made at the Hammermill Paper Company's plant at Erie, Pa., several years ago. At that time an "F" or "G" grade gum rosin was purchased in wooden barrels. The rosin after being removed from the barrels was melted by heating at 135 to 140 deg. C, for 12 to 14 hours in a steam jacketed kettle. Soda ash and, at that time, a small amount of glue were then introduced and allowed to react for 2 to 4 hours. The resulting soap was then injected with steam into water to form the emulsified rosin or size milk.

Theoretical Considerations

Under these conditions, it cannot be expected that a definite quantity of raw material will produce an equal quantity of finished product. There will be a loss of volatile matter in the rosin, a loss due to evolution of carbon dioxide from the soda ash, a loss due to chemical reaction of saponification, a loss from foreign matter such as dirt, and a loss from poor emulsification. The loss in barrels due to a naval stores trade custom is considerable, but since it is not involved in the size making process, it will be taken up in a later paragraph.

Let us consider these losses on the basis of the average analysis of a number of samples of "F" and "G" rosin which is as follows:

Loss from heating at 135 deg. C. to 140 deg. C. for 14 hours..	1.77 per cent
Unsaponifiable	6.72 per cent
Abietic Acid	87.49 per cent
Ash	0.80 per cent
Saponification Number	169
Acid Number	162
Ester Value	6.85

From this analysis it is apparent that only one loss can

* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, New York, N. Y., Feb. 18 to 21, 1935.

[1] Member TAPPI, Assistant Director of Laboratories, Hammermill Paper Company, Erie, Pa.

be predicted with any degree of certainty, namely, that due to volatile matter amounting to 1.77 per cent. Probably some loss is experienced due to unsaponifiable rosin and ash especially if the soap and size milk are filtered but how much to allow for this is difficult to determine. Probably the ash content does not reflect the total amount of foreign matter such as dirt because of the difficulty in getting a representative sample in this respect.

In the chemical combination of rosin and soda ash in the saponification reaction there is a loss of carbon dioxide from soda ash and a molecule of water from the rosin amounting to 8.73 per cent theoretically, i.e., when all of the soda ash combines with the rosin and when all of the rosin is saponifiable. However, in the mill in which this test was made, 55 per cent of the rosin is combined and sodium carbonate is found, by analysis, in the soap. This reduces the loss from this source to 4.80 per cent.

Thus combining the loss of 1.77 per cent due to volatile matter and 4.80 per cent due to the saponification reaction, there is a loss of 6.57 per cent, at least, that can be expected from analysis and theoretical considerations.

Loss Measurement on a Small Scale

We made several attempts to determine the amount of material lost in size making. In one case we prepared soap in the laboratory using one pound of rosin and simulating mill conditions as much as possible. With rosin from one source the loss from rosin to soap was 6.13 per cent, with rosin from another source of supply it was 5.42 per cent. In another case we measured the material going into one batch or cook of rosin (3000 pounds) and the amount of soap and size milk produced from it. This test showed a loss of 6.01 per cent from rosin to soap and 6.66 per cent from rosin to size milk. A test on a still larger scale over a fifteen day period which took into consideration total weight of rosin used and total amount of rosin in size milk produced showed a loss of 7.10 per cent from rosin to size milk and in a duplicate test a loss of 7.04 per cent.

Extended Study of Losses

Since all of these figures seemed low as compared with probable losses, we decided to make a more complete survey extending over a longer period and to so organize the test that every element would be carefully checked and supervised. Accordingly the following simple yet thorough procedure was adopted:

1. Measurement of rosin soap in storage at the beginning and end of the survey.
2. Weighing of all materials used during the test period.

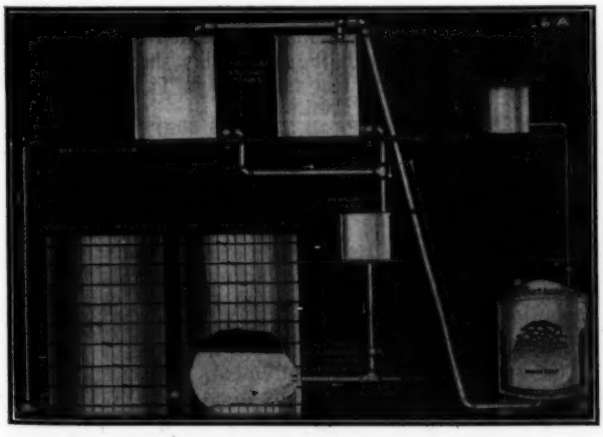


FIG. 1.
Schematic drawing of size making process

3. Measurement of the quantity of rosin soap and rosin size milk made.
4. Determination of the total dry solids in rosin soap and in rosin size milk.
5. Calculation of loss of material.

It is apparent from this outline that we planned to carefully inventory finished product, measure production, and keep account of all materials used.

Before going into the details of this procedure it should be said that the schematic drawing (Fig. 1) of the plant equipment for making size milk is presented to show the soap storage tanks, the measuring tank, and the emulsifying tank which were used to good advantage. The process is sufficiently well known to make a description of it unnecessary.

Details of Mill Test

The quantity of rosin in rosin soap in the two storage tanks was determined at the beginning and end of the test period (30 days) by measuring the height of soap in the tanks and determining the amount of solids in the soap. By coincidence entirely there was exactly the same quantity of soap in storage at the end of the survey as at the beginning, thus the quantity passed through the measuring tank became the total amount produced.

In addition to keeping an accurate record of the total amount of rosin, soda ash and glue used, the weighing and introduction of every pound of raw material was observed and checked by the man conducting this survey. No weights were taken for granted. For example, each barrel of rosin was weighed separately and the weight of the staves, heads and hoops of seven barrels deducted from the gross weight of seven barrels to obtain the net. The platform scale used for the weighings was repaired and calibrated before the test and kept in that condition during it.

The soap was run from storage into the measuring tank from which it passed into the injector line in an intermittent process. The amount of soap produced was determined by measuring the height of the soap in the measuring tank for each batch of size milk made. The dimensions of this tank were carefully taken and its capacity computed making allowance for all pipes and steam coils within it and for the small quantity of rosin which because of the type of construction never was discharged.

The emulsifying tank was used to find the quantity of size milk made. For each batch of it this tank was filled to a fixed point and emptied to the level of the pump opening each time. When the dimensions of this tank were taken, it was found "out of round" so that it became necessary to make allowance for this in computing the capacity of the tank and the quantity of each batch of size milk.

A composite sample of soap was made daily from a sample of each batch passing through the measuring tank. Temperature of each batch was recorded. A portion of the sample was used to determine moisture content and the balance to determine weight per gallon at the average daily temperature so that dry rosin in soap could be computed.

In order to secure a representative sample of size milk a valve was installed on the outlet pump of the emulsifying tank. This valve was open throughout the emptying period permitting about five gallons of emulsion to accumulate from which a sample was taken for the evaporation test to determine total solids in size milk.

While the amounts of material used for each cook of soap were weighed and the capacity of each measuring tank of soap and each batch of size milk was determined; the average moisture content and weight per gallon of

soap and solid content of size milk was applied in the calculation.

The data in Table I from the record of a typical day will serve to illustrate the items mentioned.

In this manner the amounts of solids in rosin soap and in size milk produced each day were determined. The total amount for the thirty-day period was balanced against the total amount of raw materials used and can be summarized as follows in Table II.

TABLE I

Batch No.	Height of Soap in Measuring Tank (inches)	Temp. of Soap, deg. F.	Grams Total Solids in 50 cc. Size Milk
52	38⅛	177	1.0075
53	38⅛	177	1.1225
54	38⅛	178	1.0375
55	37⅞	177	1.0875
56	37⅞	176	1.0825
57	37⅞	177	1.0625
58	37⅞	177	1.1200
59	37⅞	175	1.1304
Total	302.75	Ave. 177	1.0813

Total height rosin in tank	302.75	inches
Base area	1,256.64	square inches
Total contents of measuring tank	380,447.8	cubic inches
Allowance each batch (pipes, steam coils, residue)	1,600	cubic inches
Batches	8	
	12,800	cubic inches
Allowance for vertical pipes	463	cubic inches
Total allowance per day	13,263	cubic inches
Total contents of measuring tank	380,447.8	cubic inches
Allowance	13,263.0	cubic inches
	367,184.8	cubic inches
Amount of soap used	1,589.54	gallons
Soap weight per gallon	8.90	pounds
Total soap used	14,150.09	pounds
Moisture content of soap	38.60	per cent
Dry solids in rosin soap	8,688.15	pounds
Capacity of emulsifying tank	5,848	gallons
Tanks made	8	
Total amount of size milk	46,784	gallons
Size milk 1.0813 grams per 50 cc. =	.18047	pounds per gallon
Dry solids in size milk	8,443.11	pounds

TABLE II

Soap in storage tanks—start	75¾	inches
Soap in storage tanks—finish	75¾	inches
Amount of rosin used	167,328	pounds
Amount of soda ash used	20,160	pounds
Amount of glue used	2,800	pounds
Total amount of raw materials	190,288.00	pounds
Total weight of solids in rosin soap	180,256.78	pounds
Loss of materials rosin to soap	10,031.22	pounds
	5.27	per cent
Total weight of solids in size tank	177,269.23	pounds
Loss of materials rosin to size milk	13,018.77	pounds
	6.84	per cent

These figures of 5.27 per cent loss from rosin to soap and 6.84 per cent loss from rosin to size milk are in fairly close agreement with results of previous tests. The loss of 6.84 per cent from rosin to milk is surprisingly close to the theoretical loss of 6.57 per cent figured from the analysis of rosin and rosin soap. It is interesting to note that there is a difference of 1.57 per cent between the loss to soap and loss to milk which is an emulsification loss that could be considerably reduced by more efficient emulsifying.

Reference has been made earlier in this article to the loss due to barrels. This is an unavoidable loss since rosin is purchased on the basis of gross weight. If no attempt is made to remove rosin adhering to the staves and heads, the loss becomes greater than it should be. During the survey and test just described, the staves and heads were cleaned in the usual manner and the loss was found to be 15.36 per cent. On an individual car it was 16.13 per cent. For individual batches of seven barrels we have found it to be 15.60 per cent and 17.17 per cent. The amount of rosin not removed in all of these cases was not enough to justify cost of recovery so that these losses can be considered as due almost entirely to barrels and it will be noted that there is considerable variation.

Investigation of Saponification

Another phase of size making was also studied, namely, the effect of duration of cooking or saponification. Ordinarily saponification requires about three hours and the end point is determined by cessation of evolution of carbon dioxide and appearance of the soap both judged by experience of the size maker. A number of experimental "cooks" were made using rosin from the same shipment and keeping all factors constant except time which was varied to give a one-half hour, a one hour, a two hour, and a three hour saponification period.

The soap from each batch was analyzed as was the size milk made from it. No attempt was made to determine the effect on losses, if any, by varying the cooking time, the principal object being to determine the effect on composition of the soap and milk and on sizing quality of the paper made from each batch.

Table III shows the analysis of soaps from the four experimental batches compared with a stock soap and Table IV the analysis of the size milk produced from each.

TABLE III

ROSIN SOAPS

	Stock	½ hr. Cook	1 hr. Cook	2 hr. Cook	3 hr. Cook
Per cent free Na_2CO_3	0.04	0.23	0.15	0.04	0.03
Per cent combined alkali	6.58	6.63	6.99	6.53	6.08
Percent free rosin	39.90	38.09	41.05	40.77	41.66
Per cent combined rosin	53.66	54.69	51.72	53.19	52.26
Per cent total rosin	93.56	93.78	92.77	93.96	93.92

TABLE IV

ROSIN SIZE MILK FROM VARIOUS SOAPS

	Stock	½ hr. Cook	1 hr. Cook	2 hr. Cook	3 hr. Cook
Per cent free Na_2CO_3	0.10	0.10	0.28	0.12	0.21
Per cent combined alkali	7.65	6.80	7.07	6.55	6.38
Per cent free rosin	43.90	45.91	48.99	46.69	46.84
Per cent combined rosin	48.65	47.51	44.47	46.20	46.34
Per cent total rosin	92.40	93.42	93.46	92.89	93.18

It is apparent from the data in Tables III and IV that there was some variation in the quality of the rosin which makes it impossible to draw definite conclusions. However, there does seem to be a decrease in the amount of sodium carbonate as the cooking proceeds but under these conditions one would expect the free rosin to decrease and the combined to increase while the result was just the opposite. Soap from the one, two and three hour cooks is fairly uniform and somewhat different than that from the ½ hour cook. On the other hand, taking everything into consideration and on the basis of the stock sample all these cooks can be considered as normal. It is interesting to note the increase in free rosin and sodium carbonate with a corresponding decrease in combined rosin in the size milk, no doubt due to dissociation upon dilution.

There was no noticeable difference in sizing quality of paper on the paper machines either favorable or unfavorable when these size milks from the various soaps were used.

Hand sheets all of the same pulp beaten to a standard slowness were sized with the size milks shown in Table IV. The results of this test are given in Table V.

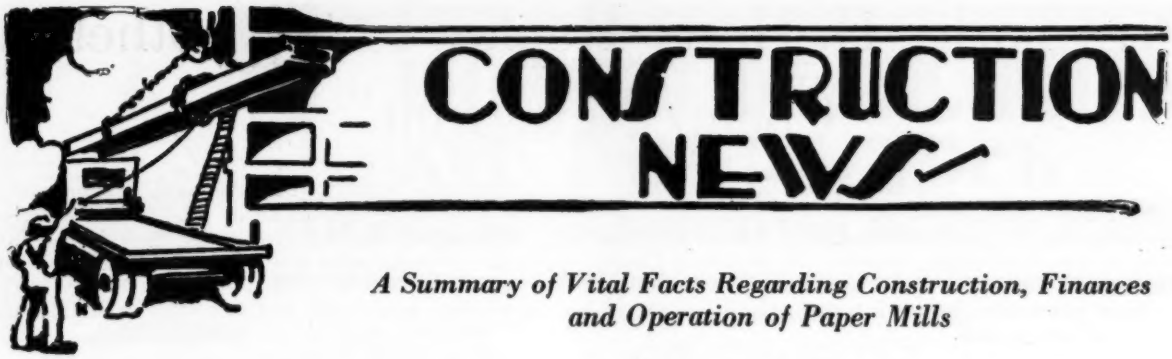
TABLE V

SIZE MILK FROM VARIOUS SOAPS

	Stock	½ hr. Cook	1 hr. Cook	2 hr. Cook	3 hr. Cook
Per cent rosin retention	44.7	49.0	51.1	54.9	49.9
Valley size tester penetration, seconds	31	37	37	40	31

If the retention and penetration of sheet sized with milk from a stock soap solution can be considered as normal, one would expect better sizing with milk from all of the other soaps but there is not sufficient consistency in the difference between the experimental milks to draw definite conclusions.

The analytical work, measurement, and checking involved in this work were done by Messrs. E. W. Gorman, J. J. Sullivan and F. E. L. Busch, working independently on these problems over a period of several years. Appreciation of their efforts and results is hereby given.



A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Savannah, Ga.—The Union Bag and Paper Corporation, Woolworth Building, New York, N. Y., has begun placing contracts for primary equipment for new pulp and paper mill, and paper converting plant at Hermitage Plantation, Savannah, where large tract of land has been acquired, previously referred to in these columns. Contract for continuous paper making-machine, producing a sheet 234 inches wide, has been let to the Pusey & Jones Corporation, Wilmington, Del., and work on unit will begin at once. It will require about six months for construction. Machine will be of latest approved design, with 48 drying cylinders each 60 inches in diameter. Awards for other equipment and machinery will be made in the near future. New mill will be equipped for a rated output of 120 tons per day and is estimated to cost close to $4,000,000, with machinery. George F. Hardy, 309 Broadway, New York, is engineer.

Wausau, Wis.—Minnesota Mining and Manufacturing Company, 791 Forest street, St. Paul, Minn., manufacturer of sandpaper and other abrasive paper stocks, has authorized plans for new addition to raw material plant at Wausau, to be one-story, 75 x 200 feet, designed primarily for storage and distribution. It will cost close to $50,000, with equipment. Toltz, King & Day, Inc., Pioneer Building, St. Paul, is architect, and will take bids soon on general contract.

Newburgh, N. Y.—The Windsor Paper Mills, Inc., has been organized with capital of 1000 shares of stock, no par value, to operate a mill in this vicinity for the manufacture of a line of paper specialties. Incorporators of new company include Michael Moses, 90 Broad street, and Morris Levinson, 1 Richmond avenue, both Newburgh.

New York, N. Y.—The Sivan Paper Box Company, manufacturer of paper boxes and containers, has leased space in building at 335 East 26th street, and will occupy for local plant.

Akron, Ohio—The Portage Paper Box Company, 474 South High street, manufacturer of paper boxes and containers, folding cartons, etc., has awarded general building contract to the Carmichael Construction Company, Akron, for new one-story addition to plant. It will cost approximately $25,000, including equipment. A building permit has been issued and superstructure will be placed under way at once.

Panama City, Fla.—Contract for about 285 tons of structural steel for new dock and storage and distributing building for the Southern Kraft Corporation, Panama City, has been awarded to the Stupp Brothers Bridge & Iron Company, 3800 Weber road, St. Louis, Mo., and work on project, previously referred to in these columns, will begin at early date. The dock will be 700 feet long and the storage building, one-story, 120 x 300 feet. Entire project will cost about $200,000 and is scheduled for completion by the close of the year. Company is a subsidiary of the International Paper Company, 220 East Forty-second street, New York., N. Y. Doullot & Ewin, Inc., Queen and Crescent Building, New Orleans, La., are general contractors for the dock and building.

New York, N. Y.—George Cohan, manufacturer of dry decalcomanias and allied paper specialties, has leased a floor and building at 41 West Seventeenth street, and will occupy for local plant.

Monroe, Mich.—The River Raisin Paper Company, manufacturer of container boards, fiber boards and other paperboard products, is giving employment to about 975 persons in all departments of local mill on regular working schedule, and will continue on present production basis for an indefinite period.

West Monroe, La.—The Brown Paper Mill Company, Monroe, manufacturer of kraft wrapping papers and allied paper products, has begun superstructure for new one-story addition to mill, 36 x 180 feet, recently referred to in these columns, and proposes to have unit ready for service in about 30 days. It will be used for storage and distribution, and is estimated to cost approximately $25,000, with equipment. W. C. Salley Company, Monroe, is general contractor.

Toronto, Ohio—Fire recently damaged a portion of the plant of the Toronto Paper Manufacturing Company, manufacturer of chip board and other paperboard specialties. It originated in stock room of one wing of the plant. An official estimate of loss has not been announced. The damage will be replaced.

Cincinnati, Ohio—The Rainbow Lithographing Company, 4142 Davis Lane, has asked bids on general contract for new addition to paper converting plant, to be three-story, 36 x 38 feet, estimated to cost over $30,000, with equipment. It is expected to award general contract and place work under way soon. Tietig & Lee, 34 West Sixth street, Cincinnati, are architects.

New York, N. Y.—Gaccione Brothers & Co., Inc., 177 South street, paper stocks, is considering rebuilding of portion of five-story storage and distributing building at South and Roosevelt streets, recently damaged by fire. The three upper floors of the structure were demolished. Loss reported over $25,000, with equipment and stock.

Merritton, Ont.—The Garden City Paper Company, Lincoln avenue, has begun superstructure for new one-story mill, for which general contract recently was let to Newman Brothers, 127 St. Paul street, St. Catherines, Ont. New unit will cost about $75,000, including equipment.

Toronto, Ont.—Fire recently damaged a portion of the plant of the Toronto Paper Manufacturing Company, operating a paper converting works. An official estimate of loss has not been announced.

Dr. Charles H. Herty Replies to "Hypothetical Cheap Newsprint"

Savannah, Ga., June 15, 1935.

Editor, PAPER TRADE JOURNAL:

In your issue of June 6 you reprinted from *Sphere* an article by Royal S. Kellogg entitled "Hypothetical Cheap Newsprint." I have just forwarded a reply to the editor of *Sphere* and enclose herewith a copy which I trust you in turn will also publish.

CHARLES H. HERTY.

The letter to the editor of *Sphere* referred to by Dr. Herty in the foregoing is reprinted below.

Under the title "Hypothetical Cheap Newsprint" in your issue of June, 1935, Royal S. Kellogg criticizes three items in the estimate of cost of production of newsprint in the South as published by this Laboratory, viz., wood costs, omission of cost of delivery to New York City, and deficiency in items of expense. Well, let's see:

First, as to wood costs. No theory is involved there. For the past twenty years kraft mills of the Southern States, which now furnish the bulk of that product in the United States market, have been buying pulpwood, each in its own neighborhood. No evidence exists of any depletion of supply with consequent enhancement of price. Nature is restoring the wood as fast as it is consumed, though it is difficult for those accustomed to forest depletion in cold climates to grasp this fact.

Kellogg states, "There is only one way for Herty's wood costs to go, and that is up," yet facts of record in going mills show that in the deepest depths of the depression wood costs dropped to $2.50 per cord. This very low price was not based on the true commercial value of the wood, but resulted from a deliberate policy of mill management which sought thereby to discourage the offerings of wood to the mills without breaking the continuous supply of amounts needed for daily operations. Now, with increased activity in business, prices have reverted to a more normal $3.50 per cord. However, in our estimate we raised this price to $4.00 per cord in the conviction that such a price would be fairer to the timber owners. In other words, our wood cost estimate is high rather than low.

How can price of raw material rise in the face of so great an oversupply? Fortunately no reliance need be placed on opinion, conjecture or over-enthusiasm in this matter, for "facts," which Kellogg loves so dearly, are now easily available. The United States Forest Service has published in five bulletins the result of actual field surveys of five of the sixteen units into which only the naval stores section of the pine forests of the South have been divided. These bulletins show an enormous pulpwood source. For example, in the three units covering the southeast, viz., southern South Carolina, southeastern Georgia and northeastern Florida, within easy reach of tidewater, the following data are given:

	Area in Acres	Pulpwood Available
South Carolina Unit No. 1.....	2,993,000	28,169,000 cords
Georgia Unit No. 1.....	6,976,200	44,966,000 cords
Florida Unit No. 1.....	7,378,900	31,599,000 cords
Totals	17,348,100	104,734,000 cords

With a United States consumption equivalent to approximately twelve million cords of pulpwood per year, with an increment of growth under average conditions of one cord per acre per year in this slash pine region, here is an abundant supply in perpetuity at the present rate of consumption in this country. And these are only three of the sixteen units to be reported on by the U. S. Forest Service. This survey does not cover the supply of loblolly, old field and Virginia pines which lie somewhat further removed from tidewater from Virginia to eastern Texas, each of which lends itself just as readily to the manufacture of pulp and paper as the slash pine.

Second, as to cost of delivery of newsprint to New York City: Kellogg, the lover of "facts," himself uses the hypothetical figure "$5.00?" This assumption was unnecessary, for a simple inquiry would have elicited the fact which I have often stated in addresses since the publication of our first estimate, that coastwise steamers are on record that they will deliver newsprint from Savannah to New York City for $3.00 per ton. I am informed that the same rate will apply from other South Atlantic ports such as Charleston, Brunswick, Fernandina and Jacksonville; and while in Texas two weeks ago I learned that east Texas ports are assured of practically the same rate.

In other words, the South is much nearer the great consuming centers of the East and the Northeast than the average present-day United States or Canadian mills, for distance in such matters is purely a matter of transportation costs.

Third—Kellogg states "the Herty figures are deficient by several items if they are to be brought into line with demonstrated experience in the most efficient existing plants." Doubtless there were minor errors in our first published estimate of cost, but these errors were just as much against us as in our favor. L. C. Anderson of the Ontario Paper Company pointed this out in a paper read before the Technical Section of the Canadian Pulp and Paper Association at its Montreal meeting in January, 1934 (see the PAPER TRADE JOURNAL of March 1, 1934). Following a critical discussion of our costs item by item he stated, "This gives a total conversion cost of $19.06 per ton, which would quite likely be met in operation." There were no dissenting voices.

Nearly two years have elapsed since our total manufacturing cost estimate was published and widely disseminated —years during which our laboratory, devoted to genuine research and not to "rainbow chasing," has gladly welcomed all visitors, distributed freely specimens of pulps, papers and rayon produced, and opened all records for inspection and transcribing if desired.

The trek of the newsprint industry will eventually be southward, just as is already true of other branches of the chemical industry, and the next great field for investment in the United States will be the Southern States.

CHAS. H. HERTY, Director,
Pulp and Paper Laboratory of the
Industrial Committee of Savannah, Inc.

Hungerford & Terry Elect Officers

At the annual meeting of Hungerford & Terry, Inc., manufacturers of water filters and water softeners, held at Clayton, N. J., June 17, 1935 the following officers were elected: Chairman of the Board of Directors: Churchill Hungerford; President: Churchill Hungerford Jr.; Vice President: Sereno F. Alling; Secretary and Treasurer: Harris D. Geschwindt.

IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING JUNE 29, 1935

CIGARETTE PAPER

H. H. Strauss, Ile de France, Havre, 1 cs.; Champagne Paper Corp., Ile de France, Havre, 380 cs; De Manduit Paper Corp., Washington, Havre, 175 cs.

WALL PAPER

Thomas & Pierson, Britannic, Liverpool, 1 cs.; ———, Berlin, Bremen, 5 cs.; F. J. Emmerich, Franconia, Liverpool, 1 cs, 1 ble.; ———, Columbus, Bremen, 1 cs. ——— Washington, Havre, 10 cs.

NEWSPRINT

Gilman Paper Co., Malaren, Hallstavik, 494 rolls; Brooklyn Daily Eagle, Malaren, Hallstavik, 309 rolls; H. Reeve Angel & Co., Inc., Malaren, Kotka, 160 rolls; Lunham & Reeve, Inc., Malaren, Kotka, 193 rolls; Jay Madden Corp., Malaren, Kotka, 268 rolls; Jay Madden Corp., Berlin, Bremen, 577 rolls; Bank of Montreal, Humberarm, Corner Brook, 3168 rolls; International Paper Co., Humberarm, Dalhousie, 4802 rolls; ———, Stavangerfjord, Oslo, 101 rolls; Jay Madden Corp., Columbus, Bremen, 136 rolls; Parsons & Whittemore, Inc., Kungsholm, Gothenburg, 250 rolls; Perkins Goodwin & Co., Deutschland, Hamburg, 298 rolls.

PRINTING PAPER

Coty Processing Co., Ile de France, Havre, 3 cs.; ———, Ile de France, Havre, 3 cs.; L. A. Consmiller, Columbus, Bremen, 2 cs.; Steiner Paper Corp., Columbus, Bremen, 11 cs.; J. H. & G. B. Siebold, Inc., Washington, Hamburg, 10 cs.; Steiner Paper Corp., Rotterdam, Rotterdam, 12 cs.

WRAPPING PAPER

———, American Banker, London, 22 pkgs.; Walker Goulard Plehn Co., Malaren, Mantyluoto, 1469 rolls; Standard Products Corp., Black Tern, Antwerp, 5 cs.; ———, Columbus, Bremen, 15 cs.; E. Dietzgen & Co., Columbus, Bremen, 64 cs.; Japan Paper Co., J. Jadot, Antwerp, 1 cs.; Globe Shipping Co., Deutschland, Hamburg, 78 rolls.

DRAWING PAPER

H. Reeve Angel & Co., Inc., Britannic, Liverpool, 1 cs.; ———, Berlin, Bremen, 2 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., Britannic, Liverpool, 4 cs.; A. W. Fenton, Inc., Deutschland, Hamburg, 90 bls.

METAL COATED PAPER

K. Pauli Co., Berlin, Bremen, 20 cs.; K. Pauli Co., Columbus, Bremen, 16 cs.

SURFACE COATED PAPER

L. A. Consmiller, Berlin, Bremen, 28 cs.; L. A. Consmiller, Columbus, Bremen, 26 cs.; Hansel Bruckman & Lorbacher, Columbus, Bremen, 7 cs.; Globe Shipping Co., Europa, Bremen, 21 crates, 1 cs.; Chas. Happel, Washington, Hamburg, 1 cs.

COATED PAPER

Chas. Happel, Deutschland, Hamburg, 4 cs.

BASIC PAPER

Dingelstedt & Co., Europa, Bremen, 5 cs.

PHOTO PAPER

J. J. Gavin, Aquitania, Southampton, 10 cs.; American Express Co., Deutschland, Hamburg, 41 cs.

DECALCOMANIAS

Phoenix Shipping Co., Berlin, Bremen, 2 cs.; L. A. Consmiller, Columbus, Bremen, 4 cs.; Sellers Transportation Co., Columbus, Bremen, 7 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., Granconia, Liverpool, 10 cs. (duplex); B. F. Drakenfeld & Co., Granconia, Liverpool, 4 cs. (simplex).

TRANSFER PICTURES

Rohner Gehrig & Co., Europa, Bremen, 2 cs., 3 bls.

TISSUE PAPER

J. Romer, Narutu Maru, Osaka, 8 cs.; B. F. Drakenfeld & Co., Franconia, Liverpool, 7 cs.; W. J. Byrnes, Aquitania, Southampton, 3 cs.; Atlantic F'd'g Co., Deutschland, Hamburg, 24 cs., 1 roll.

TRADING PAPER

Saentis, Inc., Statendam, Rotterdam, 2 cs.

STENCIL PAPER

American Indicator Paper Co., Hokuroku Maru. Kobe, 2 cs.

LITHO PAPER

Chase National Bank, Narutu Maru, Canton, 10 cs.; Senefelder Co., Narutu Maru, Canton, 5 cs.

PASTE BOARD

———, Berlin, Bremen, 46 cs.; Phoenix Shipping Co., Washington, Hamburg, 20 cs.

MISCELLANEOUS PAPER

H. Reeve Angel & Co., Inc., Houkroku Maru, Yokohama, 2 cs.; H. C. Davison Co., Houkroku Maru, Yokohama, 4 cs.; National City Bank, Houkroku Maru, Yokohama, 19 cs.; H. Reeve Angel & Co., Inc., Britannic, Liverpool, 3 cs.; ———, Narutu Maru, Osaka, 8 cs.; Keuffel & Esser Co., Washington, Hamburg, 23 cs.; Walker Goulard Plehn Co., Rotterdam, Rotterdam, 4 bls.; Appelbee & Neuman, Inc., Tricolor, Kobe, 6 cs.; Moller Products Corp., Tricolor, Yokohama, 6 cs.; U. S. Envelope Co., Tricolor, Yokohama, 14 cs.; Reynolds Metals Corp., Deutschland, Hamburg, 18 pkgs.

RAGS, BAGGINGS, ETC.

———, California, Glasgow, 28 bls. paper stock; Castle & Overton, Inc., Pipestone County, Havre, 87 bls. bagging;

———, Hokuroku Maru, Shanghai, 100 bls. cotton waste; Mitsui & Co., Ltd., Hokuroku Maru, Shanghai, 121 bls. cotton waste; ———, Hokuroku Maru, Osaka, 105 bls. rags; Castle & Overton, Inc., Cold Harbor, Dundee, 56 bls. paper stock; G. W. Miller Co., Inc., Cold Harbor, Dundee, 20 bls. paper stock; E. J. Keller Co., Inc., Cold Harbor, ———, 78 bls. paper stock; Royal Manfg. Co., Narutu Maru, Shanghai, 50 bls. cotton waste; E. J. Keller Co., Inc., Black Tern, ———, 50 bls. rags; E. J. Keller Co., Inc., Black Tern, ———, 97 bls. bagging; Royal Manfg Co., Black Tern, Antwerp, 16 bls. cotton waste; Irving Trust Co., Black Tern, Antwerp, 96 bls. jute cuttings; W. Steck & Co., Black Turn, Antwerp, 256 bls. jute waste; American Express Co., Franconia, Liverpool, 490 bags hide cuttings; ———, J. Jadot, Antwerp, 55 bls. bagging; Banco Coml. Italiane Trust Co., Excalibur, Alexandria, 69 bls. paper stock; E. J. Keller Co., Inc., Excalibur, ———, 296 bls. paper stock; E. J. Keller Co., Inc., Excalibur, ———, 26 bls. bagging; E. J. Keller Co., Inc., Columbus, ———, 19 bls. rags; Amtorg Trading Corp., T. Walton, Odessa, 434 bls. rags; J. J. Ryan & Sons, Inc., Rotterdam, Rotterdam, 136 bls. cotton waste; J. J. Ryan & Sons, Inc., Tricolor, Kobe, 146 bls. cotton waste; Loumar Textile By Products, Inc., City of Flint, Manchester, 167 bls. bagging.

GLUE STOCK

———, Giulia, Trieste, 319 bags hide glue; ———, Berlin, Bremen, 200 bags hide glue; ———, Deutschland, Hamburg, 200 bags bone glue.

OLD ROPE

Banco Coml. Italiane Trust Co., Statendam, Rotterdam, 143 coils; Chase National Bank, American Banker, London, 46 coils; E. J. Keller Co., Inc., American Banker. ———, 98 coils; ———, Cold Harbor, London, 190 coils; ———, Washington, Havre, 77 rolls.

CHINA CLAY

Whitaker Clark & Daniels, Franconia, Liverpool, 200 bags; English China Clays Sales Corp., Franconia, Liverpool, 140 bags; ———, Rotterdam, Rotterdam, 417 bags.

CASEIN

———, Deutschland, Hamburg, 60 bags.

WOOD PULP

Lagerloef Trading Co., Malaren, Mantyluoto, 1334 bls. sulphite; Lagerloef Trading Co., Malaren, Kirkkoniemi, 5100 bls. sulphite; Castle & Overton, Inc., Malaren, Kirkkoniemi, 703 bls. wood pulp; Chemical Bank Trust Co., Stavangerfjord, Oslo, 600 bls. sulphite; E. M. Sergeant Co., Stavangerfjord, Oslo, 300 bls. chemical pulp; Irving Trust Co., Stavangerfjord, Oslo, 882 bls. mechanical pulp; J. Andersen & Co., Stavangerfjord. Oslo, 1335 bls. sulphite; Johaneson Wales & Sparre, Inc., Kungsholm, Gothenburg, 600 bls. sulphate; Johaneson Wales & Sparre, Inc., Kungsholm, Gothenburg, 748 bls. kraft soda pulp; Perkins Goodwin & Co., Kungsholm, Gothenburg, 292 bls. sulphate; Price & Pierce, Ltd., Kungsholm, Gothenburg, 125 bls. sulphite; Gottesman & Co., Inc., Kungsholm, Latvia, 1249 bls. sulphite; Bank of N. Y. Trust Co., Deutschland, Hamburg, 2750 bls. wood pulp, 550 tons; Bulkley Dunton & Co., Argosy, ———, 1000 bls. wood pulp.

WOOD PULP BOARDS

Griffin-Rutgers, Inc., Deutschland, Hamburg, 6 cs.

ALBANY IMPORTS

WEEK ENDING JUNE 29, 1935

Bulkley Dunton & Co., Kersten Miles, ———, 5950 bls. wood pulp.

PORTLAND IMPORTS

WEEK ENDING JUNE 29, 1935

Gottesman & Co., Inc., Tortugas, Sweden, 10,000 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING JUNE 29, 1935

E. J. Keller Co., Inc., Pipestone County, ———, 48 bls. flaxwaste; E. Butterworth & Co., Inc., Pipestone County, Dunkirk, 112 bags hide cuttings; ———, Pipestone County, Havre, 100 bls. bagging; Irving Trust Co., Pipestone County, Havre, 81 bls. bagging; F. S. Webster, Inc., Franconia, Liverpool, 2 cs. tissue paper; G. F. Malcolm, Inc., Franconia, Liverpool, 32 cs. tissue paper; New England Waste Co., Tricolor, Kobe, 50 bls. cotton waste; Elliott Addressing Machine Co., Tricolor, Kobe, 9 cs. paper; Bulkley Dunton & Co., Argosy, ———, 750 bls. wood pulp; Parsons & Whittemore, Inc., Argosy, ———, 675 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING JUNE 29, 1935

Castle & Overton, Inc., Pipestone County, Dunkirk, 40 bls. rags; Castle & Overton, Inc., Pipestone County, Havre, 38 bls rags; Castle & Overton, Inc., Pipestone County, Havre, 37 bls. new cuttings; National Vulcanized Fibre Co., Pipestone County, Havre, 49 bls. rags; E. J. Keller Co., Inc., Pipestone County, ———, 62 bls. rags; ———, Hokuroku Maru, Osaka, 200 bls. cotton waste; ———, Cold Harbor, Hamburg, 323 bls. wood pulp, 50 tons; O. Smith & Sons Co., Narutu Maru, Shanghai, 100 bls. cotton waste; Castle & Overton, Inc., City of Flint, Manchester, 48 bls. rags; Gottesman & Co., Inc., Scanmail, Czecho-Slovakia, 681 bls. wood pulp; Gottesman & Co., Inc., Argosy, Sweden, 1563 bls. wood pulp.

BALTIMORE IMPORTS

WEEK ENDING JUNE 29, 1935

Irving Trust Co., Cold Harbor, London, 68 coils old rope; Congoleum Nairn Co., Black Tern, Antwerp, 66 bls. rags; Bulkley Dunton & Co., Kelkheim, ———, 3550 bls. wood pulp; Parsons & Whittemore, Inc., City of Newport News, ———, 150 bls. wood pulp; Parsons & Whittemore, Inc., City of Havre, ———, 1000 bls. wood pulp; Parsons & Whittemore, Inc., City of Norfolk, ———, 650 bls. wood pulp.

NORFOLK IMPORTS

WEEK ENDING JUNE 29, 1935

E. Butterworth & Co., Inc., Black Tern, Antwerp, 120 bls. bagging; E. Butterworth & Co., Inc., City of Flint, Manchester, 173 bls. bagging; Darmstadt Scott & Courtney, City of Flint, Manchester, 88 bls. bagging; Ayres, W. C. Jones Co., City of Flint, Manchester, 100 bls. cotton waste; ———, City of Flint, Liverpool, 68 bls. bagging; ———, City of Flint, Liverpool, 51 bls. paper stock.

NEWPORT NEWS IMPORTS

WEEK ENDING JUNE 29, 1935

Parsons & Whittemore, Inc., City of Norfolk, ———, 250 bls. wood pulp.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, July 3, 1935.

Conditions in the local paper market are considered satisfactory for the time of year. Demand for the various standard grades of paper is moderately active. There are a fair number of inquiries around for future needs, some of which should materialize into good orders. Prices are generally holding to schedule.

The position of the newsprint paper market is practically unchanged. Manufacturing operations are being maintained in sufficient volume to take care of current requirements. Stocks at the mills are not excessive. While quotations remain unchanged, the price situation continues unsatisfactory.

Demand for the various grades of fine paper, including book, cover, writing and ledger papers, is fairly persistent. Prices are well maintained. Tissues are in seasonal request. The coarse paper market is steady and kraft specialties for summer requirements are in excellent request. The box board market is rather quiet.

Mechanical Pulp

The groundwood pulp market is irregular, although production is practically keyed to consumption, both in North America and abroad and the statistical position of the industry is fairly sound. Shipments of mechanical pulp are going forward slowly. Quotations on the various grades are easier than of late.

Chemical Pulp

Steadiness prevails in the chemical pulp market. Demand for both domestic and foreign grades is well sustained, in most instances. Kraft pulp is particularly firm, while bleached sulphite is exhibiting a strong undertone. Soda pulp is also displaying strength. Prices are holding to formerly quoted levels.

Old Rope and Bagging

The old rope market is marking time. Paper mill demand for domestic and imported old manila rope is restricted. Small mixed rope is listless. No radical changes in prices have been reported, however. The bagging market is firm. Offerings of scrap and gunny bagging are limited. Roofing bagging is quite active.

Rags

Trading in the domestic rag market is fairly active. Demand for the various grades of cotton rags is well sustained, especially for No. 1 shirt cuttings and other grades required for export. Roofing grades are showing improvement. Offerings are scarce and quotations firmer than of late. Little change is noticed in the imported rag market

Waste Paper

The local paper stock market is slightly stronger. While board mill demand for the lower grades of waste paper is rather light, offerings are not too plentiful and prices are somewhat steadier. Old kraft machine compressed bales are arousing more interest and reports of firmer quotations for this grade are persistent.

Twine

Business in the local twine market is holding up as well as expected and there are no really definite signs of any serious midsummer lull at present. Supplies are moving into consumption in fairly good volume. Prices are generally steady to firm and reports of concessions are infrequent.

To Market Milk in Wax-Fiber Bottles

Milk in waxed-fiber bottles that may be thrown away after the milk is used will be marketed in Cleveland, beginning Friday, by Miller's Gold Seal Dairy, Inc., an eastern firm which has leased a floor of the Ohio Farmers' Co-operative Association Building at 3068 W. 106th street according to the *Cleveland Press*.

Sterlizing and air-tight sealing of the containers was demonstrated today for city and health officials. Special machinery shapes the containers, sterlizes them, coats them with paraffin, fills and seals them.

The Gold Seal dairy will deal only with stores and has no plans of entering the home delivery field, officials said.

To open the milk containers, scissors are used to clip off the top. First outlets in Cleveland for the "packaged milk" will be the Edwards food stores.

United Paperboard Co. Report

The United Paperboard Company has presented the following financial report for the year ending March 30, 1935:

Profit before depreciation, $171,221, against $203,396 in previous year; total sales, $2,661,121 against $2,099,790. Balance sheet of March 30 shows current assets of $785,642, including $324,923 cash, and current liabilities and creditors' claims of $199,171. This compares with cash of $124,958, current assets of $641,187 and current liabilities and creditors' claims of $375,799 on March 31, 1934; inventories were $277,394, against $326,366, and surplus was $462,317, against $291,096.

Kraftliner To Market Nature Kraft

The Kraftliner Gumming Corporation, Mobile, Ala., has produced and has ready for distribution a new gumming kraft under the name of Naturekraft. The company says regarding this new product:

"We find that its color is in perfect harmony with kraft paper and in addition thereto we believe it has greater strength and quicker adhesive quality than the ordinary Gummed Tape. This product is the result of the most careful study on the part of our chemical and engineering forces, who are constantly on the alert to improve gummed sealing tape."

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, July 3, 1935.

BLANC FIXE.—The position of the blanc fixe market is practically unchanged. Prices are holding to schedule. The pulp is quoted at from $42.50 to $45 per ton, in bulk; while the powder is selling at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—Steadiness prevails in the bleaching powder market. The contract movement is about normal for the season. Prices remain unchanged, in most instances. Bleaching powder is quoted at from $1.90 to $2.15 per 100 pounds, in drums, at works.

CASEIN.—The casein market is dull. Domestic standard ground is quoted at 11¼ and finely ground at 11¾; Argentine standard ground at 13¼ and finely ground at 13½; French standard ground at 13½ and finely ground at 13¾ cents per pound, in bags, car lot quantities.

CAUSTIC SODA.—Demand for caustic soda is fairly persistent. The contract movement is well up to average for the season. Solid caustic soda is quoted at from $2.60 to $3.10; while the flake and ground are selling at from $3 to $3.05 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market is moderately active. Contract shipments are moving regularly. Imported china clay is still selling at from $13.50 to $21 per ton, ship side; while domestic paper making clay is offered at from $6.50 to $12 per ton, at mine.

CHLORINE.—Trading in the chlorine market continues brisk. The contract movement is fairly heavy. Prices are steady and unchanged. Chlorine is quoted at from $2 to $2.40 per 100 pounds, in tanks, or multi-unit cars, in ton lots, or over, at works.

ROSIN.—The rosin market is marking time. Paper making gum rosin is quoted at $4.35 and wood rosin at $4.20 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $2.56 per 100 pounds, in tank cars, at works.

SALT CAKE.—Paper mill demand for salt cake is fairly active. Prices remain unchanged. Salt cake is quoted at from $12 to $13 and chrome salt cake at from $11 to $12 per ton, at works. Imported salt cake is selling at from $12 to $13 per ton, on dock.

SODA ASH.—The soda ash market is in a sound position. Shipments against contract are moving in good volume for the season. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—Conditions in the starch market are fairly satisfactory. Demand from the paper mills is well maintained. Prices are steady to firm. Special paper making starch is quoted at $3.59 per 100 pounds, in bags; and at $3.86 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—No radical changes transpired in the sulphate of alumina market. Prices are holding to schedule. Commercial grades are selling at from $1.35 to $1.50; while iron free is offered at from $1.90 to $2.05 per 100 pounds, in barrels, at works.

SULPHUR.—The sulphur market is steady. Sulphur is quoted at $18 per long ton on orders of 1,000 tons, or over, on yearly contracts; and at $20 per ton on any smaller quantity over that period. On spot and near by car loads, the quotation is $21 per ton.

TALC.—Most of the business transacted in the talc market during the past week was along routine lines. Domestic talc is still quoted at from $16 to $18 per ton, at eastern mines; while imported talc is selling at from $23 to $30 per ton, on dock.

Market Quotations

Paper

(F. o. b. Mill)

Ledgers	6.50	@	—
Bonds	6.00	@	—
Index	6.00	@	—
Writings—			
Extra Superfine	6.50	@	—
Superfine	6.25	@	—
Tub sized	5.75	@	—
Engine sized	5.50	@	—
Book, Cased—			
S. & S. C.	5.35	@	5.75
S. & S. C. Litho	5.60	@	6.00
M. F.	5.10	@	5.50
Coated and Enamel	5.90	@	6.55
Coated Litho	5.90	@	6.55
Tissues—Per Ream—			
White No. 1	.82½	@	.85
White No. 2	.67½	@	—
Anti-Tarnish M. G. only	1.00	@	—
Colored	.85	@	—
Kraft	.70	@	—
Manila	.67½	@	.70
Manila—			
No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Butchers	4.00	@	4.50
Fibre Papers—			
No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75
Common Bogus	1.50	@	3.00
Screenings	2.50	@	3.50
Glassine—			
Bleached	.11	@	—
Unbleached	.09	@	—

(The following Quotations are Delivered New York)

News, per ton—			
Roll, contract	40.00	@	—
Rolls, spot	40.00	@	—
Sheets	45.00	@	—
Kraft—			
No. 1 Northern	4.12½	@	4.75
Standard	4.00	@	—
Southern	3.87½	@	—
Boards—per ton—			
News	32.50	@	35.00
Chip	30.00	@	32.50
Sgl. Mla. Ll. Chip	45.00	@	47.50
Jute Lined Chip	45.00	@	47.50
White Patent Coated	55.00	@	57.50
Binders Boards	67.00	@	75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	21.00	@	22.00
Dry	21.00	@	22.00
(F.o.b. Mill)			
No. 1 Domestic and Canadian	18.00	@	24.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Division 1	2.60	@	—*
Division 2	2.55	@	—*
Division 3	2.50	@	—*
Prime Qualities—			
Class 1. All Prime Easy Bleaching	2.05	@	—*
Other Than Easy Bleaching—			
Class 2. Higher Than Standard	2.00	@	—*
Class 3, Standard	1.95	@	—*
Class 4. Lower than Standard	1.90	@	—
(On Dock, Atlantic Ports)			
Kraft No. 1	1.70	@	1.80
Kraft No. 2	1.50	@	1.60
(F.o.b. Pulp Mill)			
Kraft Domestic	1.70	@	2.35
(Delivered)			
Soda Bleached	2.50	@	—

*Add 60 Cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	5.75	@	6.00
Silesias No. 1	3.75	@	4.00
New Unbleached	6.25	@	6.50
New Soft Blacks	3.00	@	3.25
Blue Overall	3.50	@	3.75
Fancy	2.50	@	2.75
Washables	1.75	@	2.00
Mixed Khaki Cuttings	3.00	@	3.25
O. D. Khaki Cuttings	3.75	@	4.00
Men's Corduroy	1.50	@	1.75
New Mixed Blacks	2.50	@	2.75

Old Rags

White, No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	@	3.25
White, No. 2—			
Repacked	1.75	@	2.25
Miscellaneous	1.50	@	1.75
Thirds and Blues—			
Repacked	1.50	@	1.75
Miscellaneous	1.25	@	1.50
Black Stockings	2.50	@	3.00
Roofing Rags—			
No. 1	1.25	@	1.30
No. 2	1.10	@	1.15
No. 3	.95	@	1.00
No. 4	.95	@	1.00
No. 5A	.80	@	.85

Foreign Rags

New Rags

New Dark Cuttings	1.75	@	1.85
New Mixed Cuttings	1.80	@	1.90
New Light Silesias	3.75	@	4.00
Light Flannelettes	3.75	@	4.00
Unbleached Cuttings	6.50	@	6.75
New White Cuttings	6.56	@	6.75
New Light Oxfords	3.25	@	3.50
New Light Prints	2.75	@	3.00

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	5.00
No. 4 White Linens	2.25	@	2.50
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	2.75
No. 4 White Cotton	1.90	@	2.15
Extra Light Prints	2.00	@	2.25
Ord. Light Prints	1.75	@	1.85
Med. Light Prints	1.55	@	1.65
Dutch Blue Cottons	1.75	@	1.85
French Blue Linens	2.30	@	2.40
German Blue Linens	2.15	@	2.25
German Blue Cottons	1.70	@	1.80
Checks and Blues	1.30	@	1.40
Linsey Garments	1.50	@	1.65
Dark Cottons	1.15	@	1.25
Old Shopperies	1.00	@	1.05
New Shopperies	.95	@	1.05
French Blues	1.70	@	1.80

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	1.60	@	1.70
Domestic	1.45	@	1.55
Wool Tares, light	1.65	@	1.70
Wool Tares, heavy	1.75	@	1.80
Bright Bagging	1.65	@	1.70
Manila Rope—			
Foreign	1.85	@	2.00
Domestic	1.75	@	2.00
Small Mixed Rope	1.10	@	1.35
New Burlap Cut	2.00	@	2.35
Hessian Jute Threads—			
Foreign	2.60	@	2.75
Domestic	2.80	@	3.00

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.50	@	2.60
Ordinary Hard White No. 1	2.10	@	2.15
Hard White No. 2	1.90	@	2.00
Soft White No. 1	1.70	@	1.80
Flat Stock—			
Stitchless	.65	@	.75
Over issue Mag.	.65	@	.75
Solid Flat Book	.45	@	.50
Crumpled No. 1	.35	@	.40
Solid Book Ledger	1.50	@	1.65
Ledger Stock	1.00	@	1.10
New B. B. Chips	.30	@	.35
Manilas—			
New Env. Cut	1.70	@	1.80
New Cuttings	1.35	@	1.45
Print	Nominal		
Bogus Wrapper	.40	@	.50
Container	Nominal		
Old Kraft Machine—			
Compressed bales	1.10	@	1.20
News—			
No. 1 White News	1.20	@	1.30
Strictly Overissue	.60	@	.65
Strictly Folded	.20	@	.25
No. 1 Mixed Paper	.20	@	—

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All kinds and styles of Felts for all kinds and styles of Papers.

Write us about your Felt problems and let us help you reduce your Felt Costs—we will call anywhere at any time.

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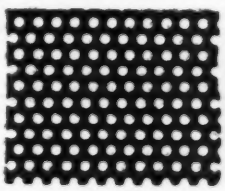

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Coarse Polished—			
India	.11¼	@	.13¾
Belg. White Hemp	.12¼	@	.15¾
India Compress	.11¼	@	.12¼
Fine Polished—			
Fine India	.19	@	.21
Special	.17	@	.19
B. C.	.25½	@	.27½
Unpolished—			
Box	.10	@	.10½
Paper Makers	.07	@	.12
Tube Rope	.08	@	.13½
Wall Paper	.09	@	.12½
Wrapping	.13	@	.18
Special	.13	@	—
Soft Fiber Rope	.10½	@	.10½

CHICAGO

Paper
(F. o. b. Mill)

Rag Bond	.12	@	.50
Water Marked Sulphite Bond	.06¼	@	.11
Sulphite Bond	.05½	@	.11
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¼
No. 3 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¼	@	.07¼
No. 2 S.&S.C. Book	.05¼	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¼	@	.05¼
No. 1 Fibre	.04¼	@	.05¼
No. 2 Manila	.04¼	@	.04¼
Butcher's Manila	.03¼	@	.03¼
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03½
Manila Tissue	.05¼	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News per ton—			
Rolls, contract	41.00	@	—
Sheets, open	46.00	@	48.50
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers
(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.70	@	.80
Solid Books	.60	@	.70
Blanks	1.00	@	1.05
Kraft	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45
Old Newspapers—			
No. 1	.30	@	.35
No. 1 Mixed Paper	.25	@	.30
Roofing Stocks—			
No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper
(Delivered Philadelphia)

Bonds	.05-9/10	@	.38
Ledgers	.06 9/10	@	.40
Writings—			
Fine No. 3	.05	@	.06
Superfine	.10	@	.18
Extra Fine	.15	@	.24
Fine	.15	@	.24
Fine, No. 2	.10	@	.25
Book, M. F.	.05¼	@	.06¼
Book, S. S. & C.	.05½	@	.07½
Book, Coated	.06½	@	.09
Coated Lithograph	.06¼	@	.08½
Label	.07	@	.11
No. 1 Jute Manila	6.25	@	—
Manila Sul., No. 1	5.25	@	—
Manila No. 2	3.75	@	—
No. 1 Kraft	5.00	@	—
Southern Kraft	4.75	@	—
Common Bogus	.03	@	—
News Print Rolls	40.00	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94
Best Tarred, 1-ply (per roll)	1.95	@	2.10
Best Tarred, 2-ply (per roll)	1.40	@	1.75
Best Tarred, 3-ply	3.00	@	3.25

Domestic Rags (New)
(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1	.03½	@	.04
New White, No. 2	.02½	@	.04
Light Silesias	.02½	@	.03
Silesias, No. 1	.03	@	.03½
Black Silesias, soft	.02½	@	.03
New Unbleached	.05	@	.05½
Washable, No. 1	.01½	@	.02
Blue Overall	.03½	@	.04
Cottons—According to grades—			
Washable, No. 2	.02½	@	.03
New Blue	.01½	@	.03
Fancy	.01½	@	.03
New Black Soft	.02	@	.04
New Light Seconds	.01½	@	.02
New Dark Seconds	1.50	@	1.75
Khaki Cuttings—			
No. 1 O.D.	.03	@	.04
No. 2 Mixed	.03	@	.04
Corduroy	.02	@	.03
New Canvas	.03½	@	.04½
New Black Mixed	.02½	@	.03½

Domestic Rags (Old)

White No. 1—			
Repacked	2.50	@	3.50
Miscellaneous	1.75	@	2.25
M. G.	3.00	@	3.75
Thirds and Blues—			
Miscellaneous	1.00	@	1.50
Repacked	1.50	@	2.00
Black Stockings (Export)	2.00	@	3.50
Roofing Stock—			
Foreign No. 1	.50	@	.75
Repacked	.70	@	.85

Bagging
(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.25	@	1.50
Domestic	1.50	@	1.75
Manila Rope	2.00	@	2.25
Sisal Rope	1.25	@	1.50
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	1.25	@	1.50
No. 2	.80	@	1.00
Wool Tares, heavy	2.75	@	—
Mixed Strings	1.15	@	1.25
No. 1 New Light Burlap	2.25	@	2.50
New Burlap Cuttings	2.00	@	2.25

Old Papers
(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.25	@	2.30
No. 2 Hard White	1.90	@	2.00
No. 1 Soft White	1.80	@	1.85
No. 2 Soft White	1.25	@	1.30
No. 1 Mixed	—	@	.75
Solid Ledger Stock	1.50	@	1.60
Writing Paper	1.00	@	1.10
No. 1 Books, heavy	.55	@	.60
No. 1 New Manila	1.35	@	1.40
Print Manila	.50	@	.60
Container Manila	.45	@	.50
Old Kraft	1.00	@	—
No. 1 Mixed Paper	.20	@	—
Straw Board Chip	.20	@	—
Binders Board Chip	.20	@	—
Corrugated Board	.40	@	—
Overissue News	.50	@	—
Old Newspapers	.30	@	—

BOSTON

Paper
(F. o. b. Mill)

Ledgers—			
Sulphite	.06	@	.12½
Rag Content	.12	@	.30
All Rag	.36	@	.52½
Bonds—			
Sulphite	.07¼	@	.11
Rag Content	.12	@	.30
All Rag	.36	@	.65
Writings	.06½	@	.20
Superfines	.11	@	.31
Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Label	.09½	@	.15
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¼	@	.06¼
Manila, Sul. No. 2	.03¼	@	.04½
No. 1 Kraft	.04¼	@	.05
No. 2 Kraft	.04½	@	.04½
(F. o. b. Boston)			
Southern Kraft	.03¾	@	.04½
(F. o. b. destination in carload lots, f. o. b. mill in less than carload lots)			
Common Bogus	.02	@	.02¼
(Delivered New England points)			
News Print Rolls	39.50	@	—
Straw Board, rolls	.009	—	@35.00
Straw Board in Sheets, basis 35s to 70s	—		@40.00
Filled News Board	40.00		@45.00
Chip Board	37.50		@40.00
Chip Board (Creasing)	37.50		@40.00
Single Manila Lined Chip	47.50		@52.50
Single White, Patent Coated News Board (Bender)	55.00		@65.00
Wood Pulp Board	70.00		@75.00
Binder Boards (Standard Grade)	67.00		@75.00

Old Papers
(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.00	@	2.20
No. 1 Soft White	1.75	@	1.90
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.40	@	1.50
Overissue Ledger Stock	1.15	@	1.30
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	.55	@	.65
No. 1 Books, light	.50	@	.60
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.30	@	1.40
No. 1 Old Manila	.60	@	.65
White Blank News	1.15	@	1.20
No. 1 Kraft	.90	@	.95
Mixed Papers	.20	@	.22½
Print Manila	.40	@	.45
Container Manilas	.25	@	—
Overissue News	—	@	.35
Old Newspapers	.25	@	.27½
Box Board Chips	—	@	.25
Corrugated boxes	.32½	@	.37½
Screening Wrappers	.40	@	.45

Bagging
(F. o. b. Boston)

Manila Rope—			
Foreign	1.80	@	1.90
Domestic	1.50	@	1.75
Transmission Rope	.90	@	1.00
Jute Rope	1.50	@	1.60
Jute Carpet Threads	.65	@	.70
Gunny No. 1—			
Foreign	1.80	@	—
Domestic	1.35	@	—
Bleachery Burlap	4.00	@	4.50
Scrap Burlap			
Foreign	1.75	@	1.85
Domestic	1.30	@	1.35
Scrap Sisal	1.05	@	1.15
Scrap Sisal for Shredding	1.10	@	1.25
Wool Tares, heavy	1.30	@	1.35
New Burlap Cuttings	1.60	@	1.75
Australian Wool Pouches	2.50	@	2.75
Heavy Baling Bagging	1.40	@	1.50
Paper Mill Bagging	1.25	@	—
Bagging No. 2	.70	@	.75

Domestic Rags (New)
(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.01¼	@	.02
New White No. 1	.05½	@	.06
New White No. 2	.03½	@	.04
Silesias No. 1	.04¼	@	—
New Black Silesias	.02½	@	.03
Soft Unbleached	.06¼	@	.06½
Blue Cheviot	—	@	4.6
Fancy	.0195	@	.021
Washable	.0165	@	.0170
Cottons—According to grades—			
Blue Overalls	.04	@	—
New Black soft	.03	@	.04
Khaki Cuttings	.03½	@	.03¾
O. D. Khaki	.03	@	.03¼
Corduroy	.01¾	@	.02
New Canvas	—	@	.05
B.V.D. Cuttings	—	@	.06¼

Domestic Rags (Old)
(F. o. b. Boston)

Canvas	04½	@	
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.25	@	1.50
Thirds and Blues			
Repacked	2.00	@	2.75
Miscellaneous	2.00	@	2.25
Black Stockings	2.50	@	3.00
Roofing Stock			
No. 1	1.20	@	1.25
No. 2	.95	@	1.00
No. 3	—	@	.65

Foreign Rags
(F. o. b. Boston)

Dark Cottons	1.30	@	—
New White Shirt Cuttings	5.50	@	6.00
Dutch Blues	2.00	@	2.50
New Checks & Blues	2.50	@	3.00
Old Fustians	1.75	@	—
Old Linsey Garments	—	@	1.75

TORONTO

Paper
(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.11	@	—
No. 2 Sulphite	.08½	@	—
No. 1 Colored	.12	@	—
No. 2 Colored	.09	@	—
Ledgers (sulphite)			
Ledgers, No. 1	.34½	@	—
Ledgers, No. 2	.25½	@	—
Writing	.09	@	.09½
Book—			
No. 1 M. F. (Carloads)	6.50	@	—
No. 2 M. F. (Carloads)	6.00	@	—
No. 3 M. F. (carloads)	5.00	@	—
No. 1 S. C. (carloads)	7.00	@	—
No. 2 S. C. (carloads)	6.50	@	—
No. 3 S. C. (carloads)	5.20	@	—
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	5.25	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft No. 2	5.40	@	—

(F.O.B. Cars Toronto)

News per ton—			
Rolls (contract)	39.50	@	—
Sheets	42.00	@	—

Pulp
(F. o. b. Mill)

Ground wood	27.00	@	—
Unbleached sulphite	42.00	@	—
Book (Class 1)	58.00	@	—
Writing (Class 2)	59.00	@	—
Select (Class 3)	60.00	@	—

Old Waste Paper
(In carload lots, f. o. b. Toronto)

Shavings			
White Env. Cut	2.00	@	2.30
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	.90	@	1.00
Light and Crumpled Book Stock	.80	@	.90
Ledgers and Writings	1.00	@	1.05
Manilas—			
New Manila Cut	1.25	@	1.40
Printed Manilas	.50	@	.60
Kraft	1.00	@	1.60
News—			
Strictly Overissue	.60	@	—
Strictly Folded	.50	@	—
No. 1 Mixed Paper	.40	@	—

Domestic Rags
(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.06	@	—
Fancy Shirt Cuttings	.02	@	—

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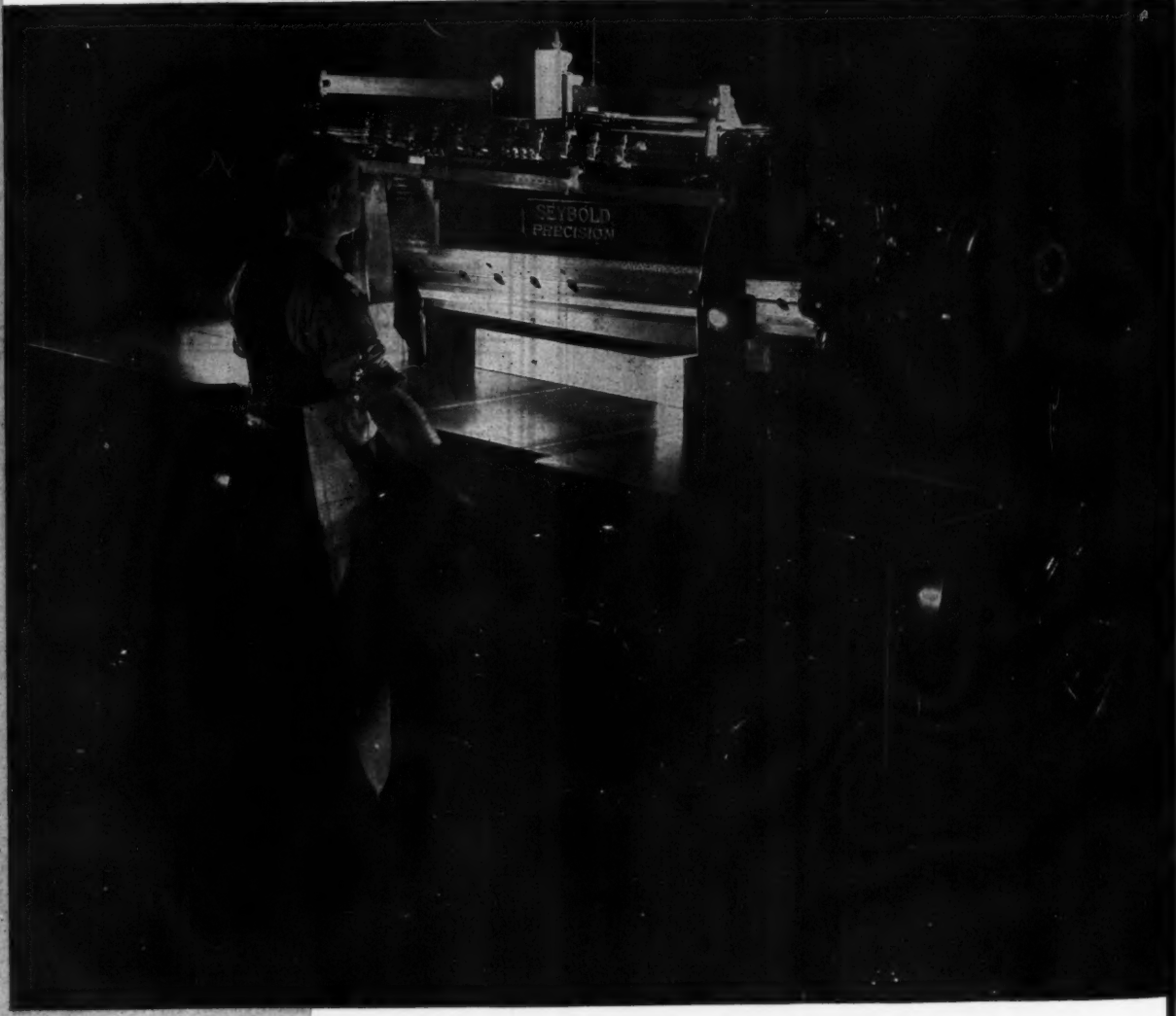

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